



YIDUOZYME X-5002 Compound Amylase



广东溢多利生物科技股份有限公司
GUANGDONG VTR BIO-TECH CO.LTD.

Add: No.8,Pingbei Rd1,Science & Technology Industry Zone, Nanping, Zhuhai,Guangdong,China.

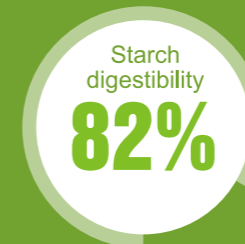
电话Tel: 86-756-8676888 传真Fax: 86-756-8673989 邮编P.C.: 519060

Email: vtr@vtrbio.com http://www.yiduoli.com



The necessity of amylase added in animal feed

Starch is the main energy source for livestock and poultry. More than 60% of energy for animal growth comes from starch digestion. Noy research have shown that the terminal ileum digestibility of corn starch is less than 82% and maintained this ration though all period of animal growth. Starch in raw materials include amylose and amylopectin which formed by connecting glucose with α -1, 4-glycosidic bond and α -1, 6-glycosidic. However, the enzymes which breaking α -1, 6-glycosidic bond in single stomach animal are limited and weak. Thus, exogenously supplementing with amylase and α -1, 6-glycosidase could improve the utilization ratio of starch and the production performance of animals.



YIDUOZYME X-5002, a specific and efficient concentrated compound amylase product which designed by Guangdong VTR Bio-Tech Co., Ltd.. Through microbial fermentation, bionic digestion in vitro and according to animal digestion characteristics and starch structural characteristics of feed sources, the developed compound amylase shows high pertinence and practicality to digest the feed starch.

Characteristics of X-5002

- According to the characteristics of starch structure of feed ingredients, α -amylase, Glucoamylase and pullulanase were scientifically combined.
- All single amylase were produced by feed enzyme fermentation microbes.
- According to animal digestion and absorption, single enzymes with different source and properties were combination and showed high synergistic effect.
- Amylase combination were screened through animal application trials.
- Excellent animals adaptability and high biological value.



The single amylase was picked according to animal physiological characteristics.



High enzyme activity under the animal body temperature.

The amylase optimum pH value close to the corresponding intestine digesta pH. Higher enzymatic hydrolysis efficiency to starch. Excellent stability, including heat stability, storage stability and the tolerate stability to gastric hydrochloric acid, pepsin, trypsin and metal ions.



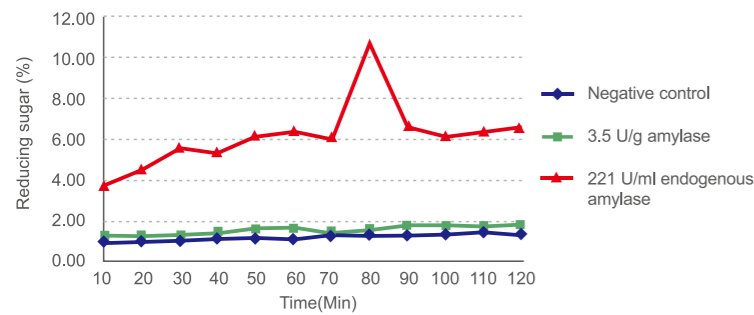
High diversity of enzyme species. The catalytic reactions cooperate with different enzymes. Complementary in optimal conditions, stress resistance and digestive tract segments.

The synergistic effects between different enzymes.

- Compared with single amylase, the concentration of reducing sugar is more continuous and stable.
- According to the balance of animal digestion and absorption, the reducing sugar increased slowly within 75min, avoiding to stimulate the satiety center of animals, and inhibit feeding.
- After 75min, reducing sugar concentration increased rapidly and starch digestibility was improved.

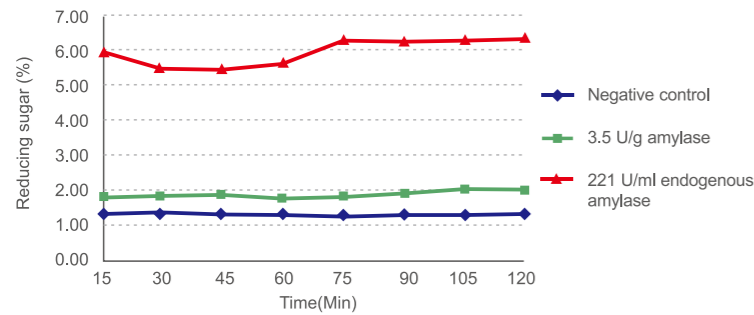
Enzymatic hydrolysis effect of X-5002 *in Vitro*

The enzymatic hydrolysis rule of endogenous amylase(pH=3.0)



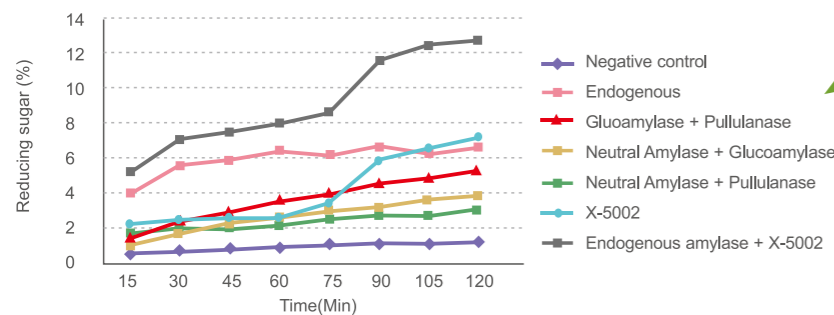
Hydrolysis of starch by endogenous enzymes in acidic environment had a reducing sugar production peak at the 80min. This time corresponding to starch digestion in duodenum.

The enzymatic hydrolysis rule of endogenous amylase(pH=6.5)



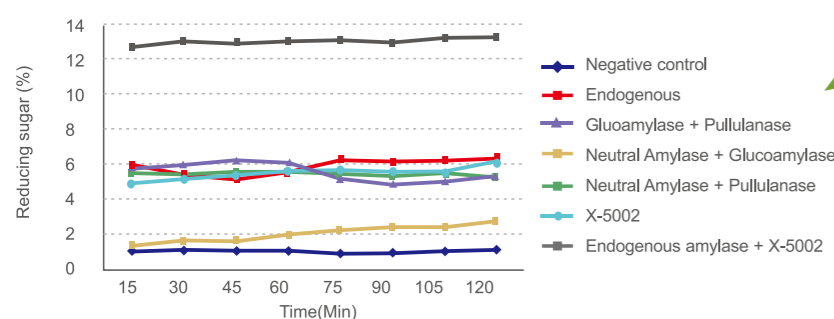
In neutral environment, the reducing sugar concentration produced by endogenous enzyme hydrolysis decreased by 65% than acidic environment. And then, the reducing sugar gradually recovered, and remained stable after 75min. In order to maintain the homeostasis of reducing sugar in jejunum, animal have to secrete a large amount of amylase. Studies have shown that jejunal amylase activity is 9.2 times higher than that in duodenum. Compensatory amylase secretion would be reduce the energy and protein usage for animal growth.

The enzymatic hydrolysis rule of exogenous and endogenous amylase(pH=3.0)



Combined use of endogenous enzyme and X-5002 in acidic environment can effectively increase the concentration of reducing sugar hydrolyzed from starch. The reducing sugar concentration significantly and stably increased, and the concentration higher than endogenous enzyme group after hydrolysis for 90min, which beneficial to the starch digestion and absorption.

The enzymatic hydrolysis rule of exogenous and endogenous amylase(pH=6.5)



X-5002 improved the deficiency of reducing sugars produced by endogenous amylase under neutral conditions, which reflects the synergistic effect of exogenous amylase and endogenous amylase.

Application effects of Yiduozyme X-5002 on broiler chickens

Compared with control group, the broiler feeding diet with X-5002 significantly increased the final BW 4.75% ($P < 0.05$) and ADG 5.01% ($P < 0.05$) in 1- 21 days.

Effects of Yiduozyme X-5002 on growth performance of broiler chickens in 1-21 days

Items	Initial BW, g	Final BW, g	ADG, g	ADFI, g	F/G	Survival ratio, %
Control	46.6 ± 0.2	859.9 ± 13.6 ^b	38.7 ± 0.6 ^b	48.3 ± 1.0	1.25 ± 0.01	100.00
α-amylase	46.8 ± 0.3	869.6 ± 12.7 ^{ab}	39.2 ± 0.6 ^{ab}	48.5 ± 1.5	1.24 ± 0.04	99.29 ± 0.83
Pullulanase	46.8 ± 0.1	864.5 ± 22.7 ^{ab}	38.9 ± 1.1 ^{ab}	48.4 ± 1.1	1.24 ± 0.05	100.00
Glucoamylase	47.0 ± 0.1	870.9 ± 38.3 ^{ab}	39.2 ± 1.8 ^{ab}	48.4 ± 0.8	1.23 ± 0.04	100.00
α-amylase + Glucoamylase	46.7 ± 0.2	875.7 ± 15.0 ^{ab}	39.5 ± 0.7 ^{ab}	48.9 ± 0.4	1.24 ± 0.02	100.00
α-amylase + Pullulanase	47.0 ± 0.3	865.6 ± 18.8 ^{ab}	39.0 ± 0.9 ^{ab}	48.6 ± 1.6	1.25 ± 0.04	100.00
X-5002	46.7 ± 0.3	900.7 ± 19.9 ^a	40.7 ± 1.0 ^a	49.6 ± 0.8	1.22 ± 0.05	100.00

Note: ^{ab}Means in a row with no common superscript differ significantly ($P < 0.05$)

Compared with control group, the broiler feeding diet with α-amylase + Glucoamylase or X-5002 significantly increased ($P < 0.05$) the ADG 3.04% and 3.62% from 22 to 42 days, respectively. The broiler FCR were significantly decreased ($P < 0.05$) in all groups adding with enzymes except α-amylase + pullulanase group.



Effects of Yiduozyme X-5002 on growth performance of broiler chickens in 22-42 days

Items	Initial BW, g	Final BW, g	ADG, g	ADFI, g	F/G	Survival ratio, %
Control	859.9 ± 13.6 ^b	2598.5 ± 56.5 ^b	82.8 ± 2.1 ^b	154.4 ± 11.5	1.77 ± 0.08 ^a	99.29 ± 0.83
α-amylase	869.6 ± 12.7 ^{ab}	2643.0 ± 51.8 ^{ab}	84.4 ± 2.1 ^{ab}	155.0 ± 4.8	1.74 ± 0.03 ^b	99.29 ± 0.83
Pullulanase	864.5 ± 22.7 ^{ab}	2641.1 ± 52.9 ^{ab}	84.6 ± 2.9 ^{ab}	156.8 ± 2.8	1.75 ± 0.06 ^b	98.93 ± 1.37
Glucoamylase	870.9 ± 38.3 ^{ab}	2645.3 ± 51.7 ^{ab}	84.5 ± 1.2 ^{ab}	156.6 ± 2.4	1.75 ± 0.05 ^b	99.29 ± 0.83
α-amylase + Glucoamylase	875.7 ± 15.0 ^{ab}	2667.2 ± 56.8 ^{ab}	85.3 ± 2.7 ^a	156.5 ± 2.4	1.73 ± 0.07 ^b	99.64 ± 0.72
α-amylase + Pullulanase	865.6 ± 18.8 ^{ab}	2605.4 ± 73.4 ^{ab}	82.8 ± 3.6 ^{ab}	152.9 ± 7.3	1.75 ± 0.07 ^{ab}	100.00
X-5002	900.7 ± 19.9 ^a	2702.3 ± 73.8 ^a	85.8 ± 1.7 ^a	156.1 ± 3.8	1.72 ± 0.07 ^b	99.29 ± 0.82

Note: ^{ab}Means in a row with no common superscript differ significantly ($P < 0.05$)

Effects of Yiduozyme X-5002 on carcass characteristic of broiler chickens in 22-42 days

Items	Dressing percentage %	Half net carcass %	Whole net carcass %	Abdominal fat c %	Breast muscle rate %	Leg muscle rate %
Control	92.51 ± 1.94	85.70 ± 1.60	72.58 ± 1.57	2.08 ± 0.64	25.02 ± 1.35	21.17 ± 0.72
α-amylase	93.15 ± 1.56	84.29 ± 3.77	72.61 ± 3.26	2.03 ± 0.36	25.99 ± 2.57	31.13 ± 1.61
Pullulanase	92.14 ± 0.46	85.07 ± 0.73	72.88 ± 1.95	1.81 ± 0.22	24.41 ± 3.55	20.57 ± 1.32
Glucoamylase	91.58 ± 1.05	84.37 ± 0.79	72.26 ± 0.99	1.67 ± 0.71	25.13 ± 1.27	21.14 ± 1.62
α-amylase + Glucoamylase	91.40 ± 0.41	84.46 ± 1.12	72.29 ± 1.31	2.12 ± 0.59	25.70 ± 3.06	19.45 ± 0.71
α-amylase + Pullulanase	92.01 ± 1.77	83.97 ± 3.16	71.96 ± 3.14	1.97 ± 0.87	24.12 ± 1.06	20.89 ± 1.68
X-5002	91.12 ± 3.30	85.92 ± 2.39	72.92 ± 1.72	2.00 ± 0.62	25.51 ± 0.89	20.96 ± 0.67

Note: ^{a,b}Means in a row with no common superscript differ significantly ($P < 0.05$)

Application effects of Yiduozyme X-5002 on pigs

Compared with control group, the piglet feeding diets with different amylases were significantly improved ($P < 0.05$) the growth performance. Among of that, supplementing with X-5002 compound amylase had better effect on growth promoting than others.

Effects of Yiduozyme X-5002 on growth performance of weaning piglets

Items	Initial BW, kg	Final BW, kg	ADG, kg	ADFI, kg	ADFI, kg
Control	8.83	18.85 ^b	0.36 ^b	0.61 ^b	0.61 ^b
α-amylase + Glucoamylase	8.90	20.08 ^a	0.40 ^a	0.64 ^a	0.64 ^a
α-amylase + Pullulanase	8.89	19.87 ^a	0.39 ^a	0.62 ^a	0.62 ^a
X-5002	8.85	20.67 ^a	0.42 ^a	0.67 ^a	0.67 ^a
SEM	0.04	0.67	0.02	0.02	0.02

Note: ^{a,b}Means in a row with no common superscript differ significantly ($P < 0.05$)



Compared with the control group, feeding pigs diets with amylase were increased the growth performance, while the effect have no significant. The pigs in X-5002 group had a better ADG than other group mainly through decreasing the FCR which may associate with the improved starch digestibility.

Effects of Yiduozyme X-5002 on growth performance of growing finished pigs

Items	Initial BW, kg	Final BW, kg	ADG, g	ADFI, g	FCR
Control	50.42 ± 5.03	70.84 ± 7.05	729.3 ± 113.3	2086.7 ± 179.5	2.86 ± 0.12
α-amylase + Glucoamylase	50.51 ± 5.08	71.86 ± 5.95	762.4 ± 73.6	2083.3 ± 145.8	2.70 ± 0.16
α-amylase + Pullulanase	50.65 ± 4.84	71.15 ± 5.95	732.0 ± 92.9	2071.7 ± 110.0	2.79 ± 0.06
X-5002	50.68 ± 4.76	72.38 ± 6.97	775.1 ± 111.6	2100.0 ± 175.4	2.67 ± 0.09

Note: ^{a,b}Means in a row with no common superscript differ significantly ($P < 0.05$)

Dosage & Usage

- Recommended Dosage: 250 g/t in complete feed. Dosage in concentrated feed or premix need to calculate according to ratio in complete feed.
- Please contact VTR's sales representatives for technical supports for formulation adjustment.

Precautions

- The product addition is small, requires premix before adds into bulk ingredient.
- Avoid moisture and seal the package tightly after use.

Packaging, Transportation, and Storage

- Standard package of is 25kg/bag.
- Keep away from sun and rain and forbid transport with poisonous and harmful material.
- Store in dry, ventilated and cool places.

Shelf Life

- 12 months from manufacture