PERFLYBIO™

PerMicro BC

Bacillus Coagulans PFK1202
Strong Acid Producing
Gastric Acid Resistance
High Temperature Resistance

PerMicro BC

PerMicro BC is the probiotic product that has the characteristics of strong acid-producing, gastric acid resistance and high temperature resistance, produced by Hunan Perfly Biotech Co., Ltd.

Composition

This product contains strong acid producing bacillus coagulans and other effective microorganism. The main content of each type is as follows:

Table1. The Category of Bacillus Coagulans

Product Type	Effective Spore Content（cfu/g）
PerMicro BC I	5×10^{9}
PerMicro BC II	1×10^{10}

Intestinal Health and Endogenous Acid Producing

Intestinal health is very important to production performance and economic benefit of breeding animals. The intestinal health should include the integrity of mucosal structure barrier and chemical barrier and the balance of intestinal micro-ecology. A variety of microorganisms inhabit in the gastro-intestinal tract of the animals, the number is above 10 trillion, and the majority of them are in the hind-gut. Microorganisms include beneficial bacteria and harmful bacteria, under normal circumstances, both are in a dynamic balance to maintain the normal physiological function in intestinal tract. Once the animals suffer from many kinds of stress such as weaning, changing fodder, transfer fence, transportation, pathogen infection, micro-ecology balance will be broken in animals, the harmful

bacteria occupy the dominant position, intestinal problems appear in animals, such as the low ability to digest and absorb nutrient, the low feed conversion, deteriorated feeding environment (ammonia concentration) and the decline in immunity, severely obvious diarrhea and diseases happened.

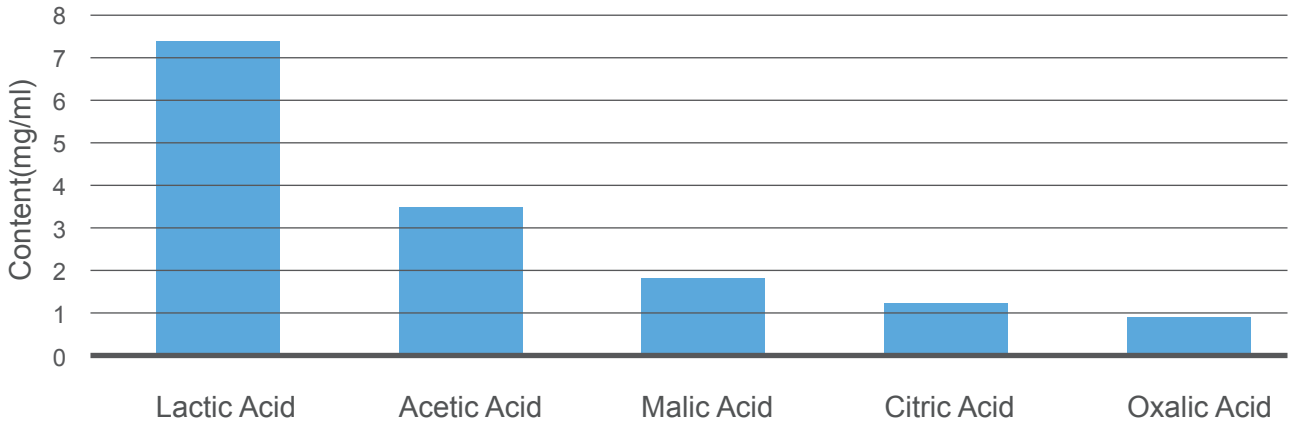
Antibiotics were used to suppress the intestinal flora unbalance and diarrhea in the production practice. In addition, with the development of prohibiting antibiotics (colistin also will be banned), with regard to gram negative bacteria that can cause diarrhea, the drug that we can choose is less. At the same time, one of the factors that leads to micro-ecology unbalance is the application of large dose of antibiotics. In this case, the micro-ecology (especially for micro-ecology preparation, such as bacillus coagulans) that plays the roles of the antibacterial, sterilization, regulating the intestinal micro-ecology balance, and reducing the application of antibiotics is the first choice.

Action Mechanism

1. PerMicro BC has the ability to produce lactic acid and other organic acids

PerMicro BC can produce lactic acid, acetic acid and other organic acids. It is conducive to improve the intestinal ability of digestion and absorption

Figure 1. The Analysis of Metabolites of PerMicro BC



2. PerMicro BC has the bacteriostatic ability

PerMicro BC in the process of growth produces antibacterial substance — coagulin, it effectively inhibits the growth of harmful bacteria and has no inhibitory effect on lactobacillus.

Table 2. The Bacteriostatic Effect of Bacillus Coagulans

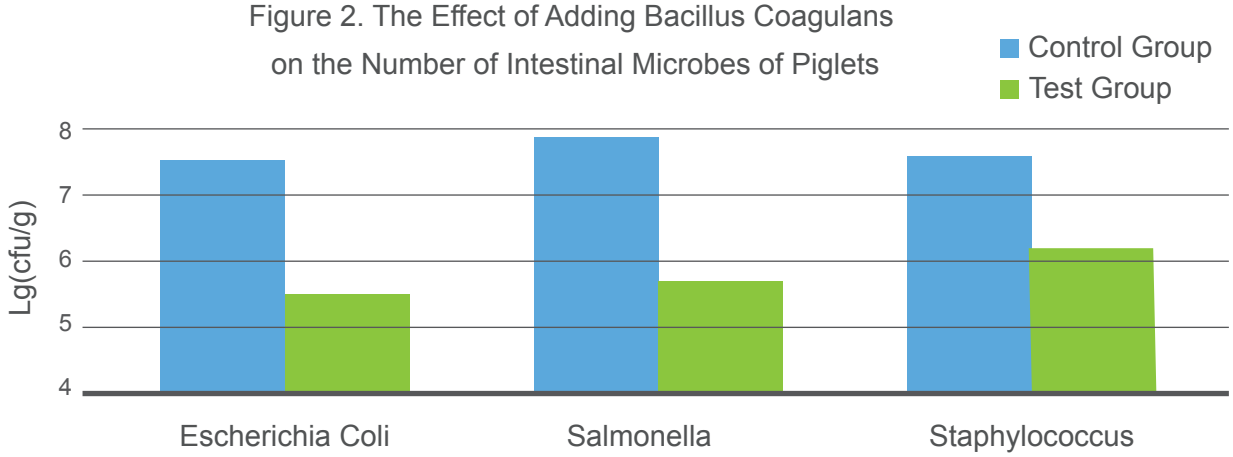
Common Pathogenic Bacteria	Bacteriostatic Level	Common Pathogenic Bacteria	Bacteriostatic Level
Salmonella	+	Chicken Escherichia Coli	++
Staphylococcus Aureus	++	Pseudomonas Aeruginosa	++
Pig Escherichia Coli	++	Plant Lactobacillus	-

NOTE: The diameter of inhibition zone (mm) + +: >12; +: 6~12; -: has no inhibitory effect.

3. PerMicro BC can improve animal intestinal micro ecosystem

It can be seen that PerMicro BC significantly improves piglets' intestinal micro-ecology environment to reduce the number of harmful bacteria and increase the number of beneficial bacteria.

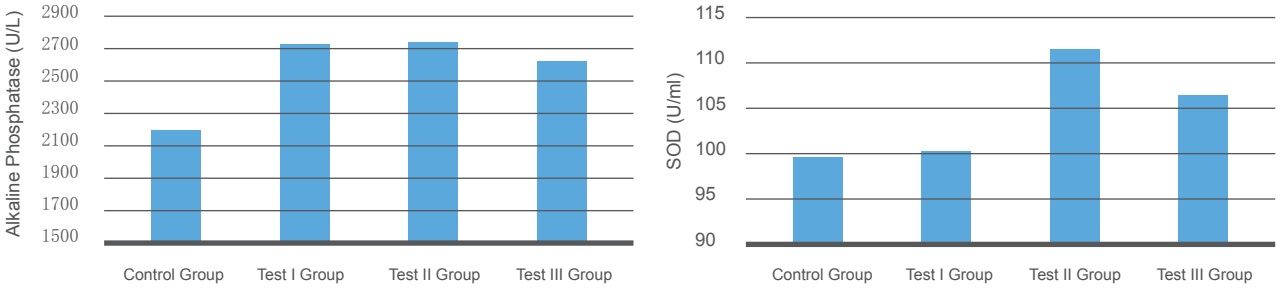
Figure 2. The Effect of Adding Bacillus Coagulans on the Number of Intestinal Microbes of Piglets



4. PerMicro BC can improve immunity

The Figure 3. shows PerMicro BC can enhance broilers' immunity, in broiler diets add bacillus coagulans could significantly improve the broilers' enzyme activities of alkaline phosphatase (AKP) and superoxide dismutase (SOD); it can effectively improve antibacterial activity and the weight gain rate.

Figure 3. The Effect of Adding Bacillus Coagulans on Immunity of Broilers

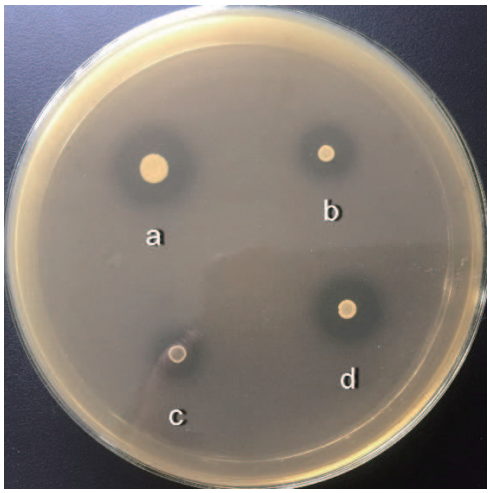


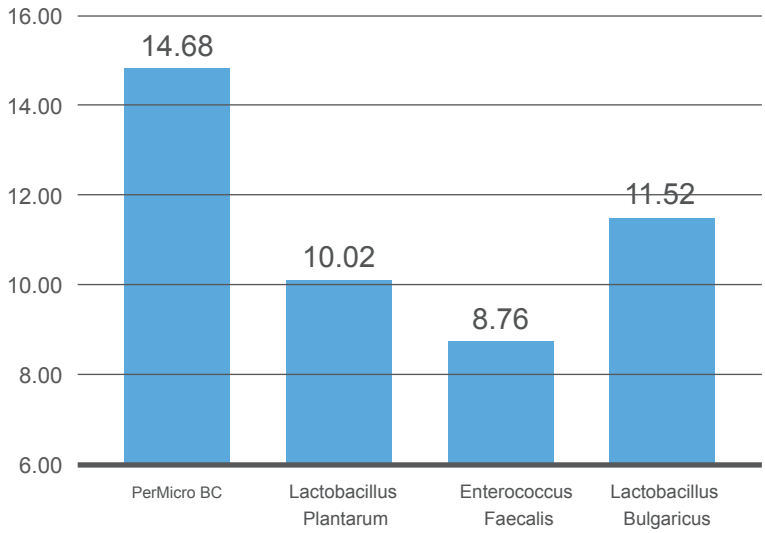
Characteristics

Bacillus coagulans is a kind of facultative anaerobic probiotics which has the advantages of lactic acid production of lactobacillus and strong resistance of bacillus.

1. PerMicro BC has the strong ability to produce acid

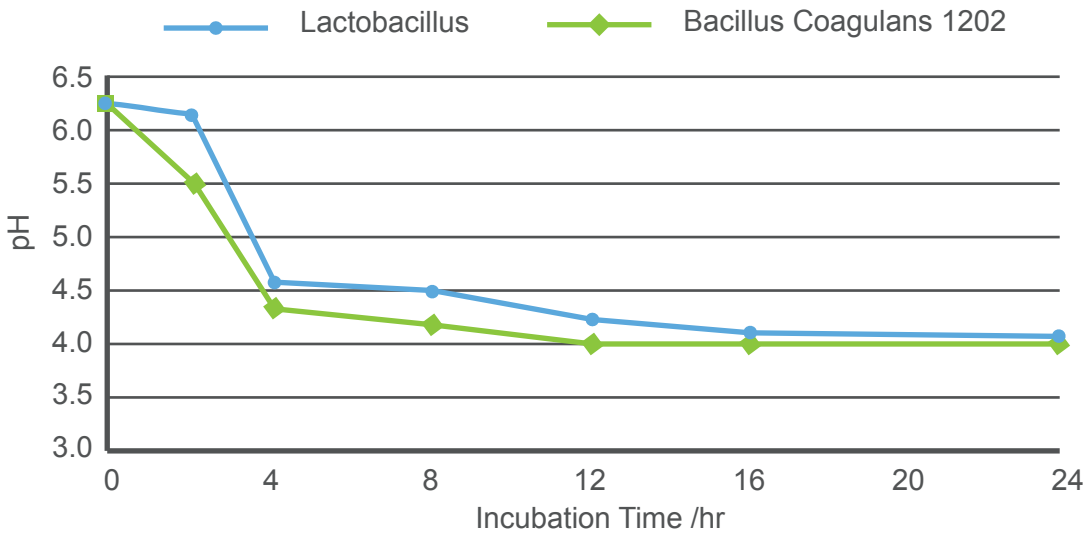
Figure 4. The Comparison of Acid-producing Ability between PerMicro BC and Other Bacteria
(a: PerMicro BC; b: Lactobacillus Plantarum; c: Enterococcus Faecalis; d: Lactobacillus Bulgaricus)





The left picture shows the comparison of acid output among different acid-forming bacteria on 0.1% calcium carbonate medium, the acid output is more and the transparent zone is bigger.
The right figure contrasts the diameter (mm) of transparent zone on 0.1% calcium carbonate medium among different acid-producing bacteria.

Figure 5. The Comparison of Acid-producing Ability between PerMicro BC and Lactobacillus

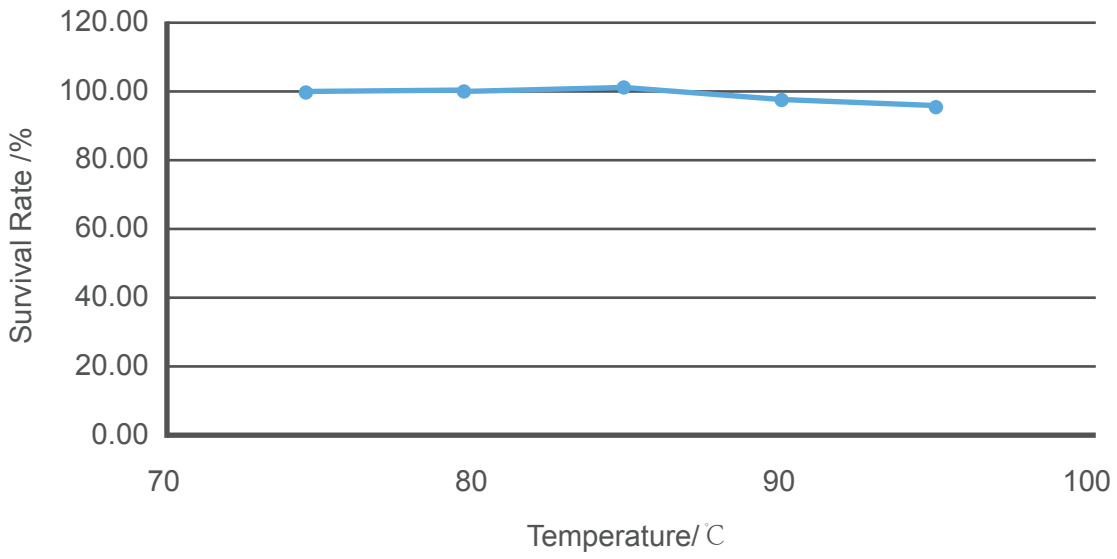


2. PerMicro BC has the strong ability to resist

① PerMicro BC has the ability to resist high temperature

PerMicro BC has a strong ability to resist high temperature, it has been treated for 5min at 95℃, the survival rate could reach more than 90%.

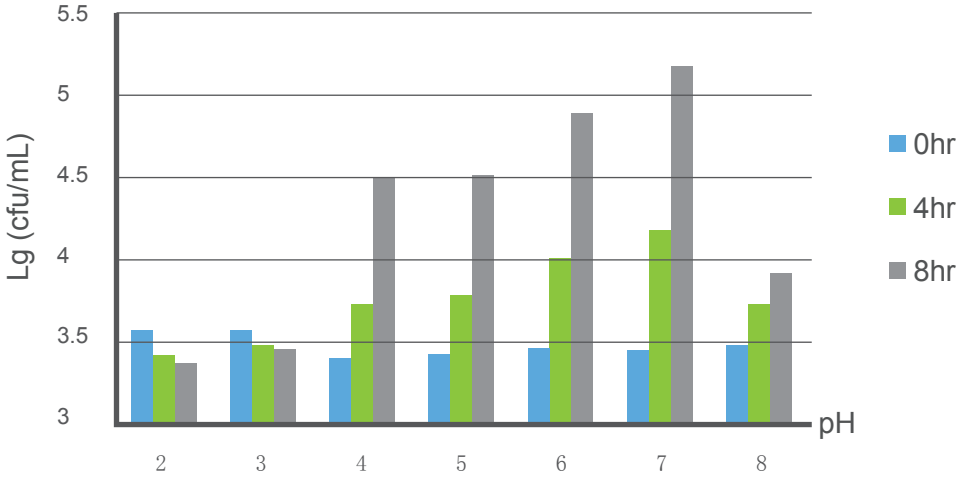
Figure 6. The Effect of Different Temperature on Survival Rate of PerMicro BC



② PerMicro BC has the ability to resist gastric acid

The Figure 7. shows the survival rate of PerMicro BC in the scope of pH 3 - 9 is more than 90%, under the condition of pH 4 - 7, PerMicro BC can propagate rapidly, the viable bacteria count can increase several times quickly.

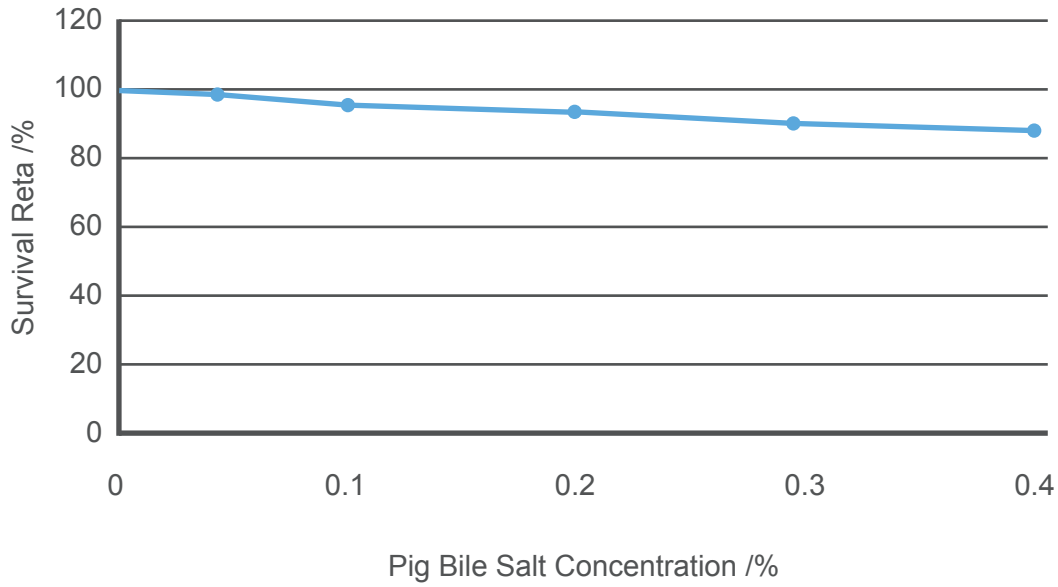
Figure 7. The Effect of Different pH Buffer Solution on Viable Bacteria Count of PerMicro BC



③ PerMicro BC has the ability to resist pig bile salt

From Figure 8. PerMicro BC can resist the pig bile salt that has the high concentration, when the concentration of pig bile salt is 0.3%, the survival rate of bacillus coagulans can still reach more than 90%.

Figure 8. The Effect of Different Pig Bile Salt Concentration on Survival Rate of Bacillus Coagulans



④ PerMicro BC has the ability to resist antibiotics

PerMicro BC can be resistant to the most of antibiotics in feed factory.

Table 3. The Value of MIC for Common Antibiotics

Drug Name	MIC (μg/ml)	Drug Name	MIC (μg/ml)
Diclazuril	256	Terramycin	128
Neomycin	256	Oxytetracycline Calcium	128
Quinocetone	256	Enduracidin	256
Kitasamycin	256	Flavomycin	256
Aureomycin	128	Nosiheptide	256
Olaquindox	128	Salinomycin	256
Bacitracin Zinc	256	Virginiamycin	256

Efficacy

1. PerMicro BC has the ability of strong acid-production, it reduces the intestinal pH and inhibits the growth of harmful bacteria for improving the intestinal environment.

2. PerMicro BC improves the immunity of animals and reduces the use of antibiotics.

3. PerMicro BC significantly reduces the diarrhea rate of piglets to reduce the rate of feed to meat and to increase the feed conversion.

4. PerMicro BC cleans the intestinal tract and reduces the blood ammonia and the odor of feces to improve the feces and feeding environment.

Trial Effect

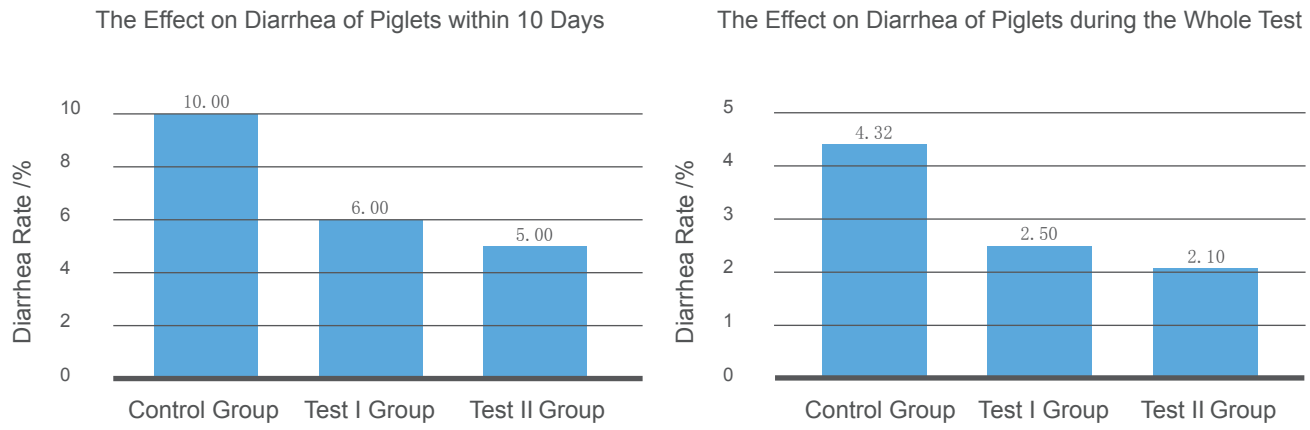
1. The application effects of PerMicro BC II on weaning piglets

28 day-old (weaning at 26 day-old) Duroc×Landrace×Yorkshire crossbred weaning piglets were selected, the total number was 90. According to the similar age and average weight, they were divided into three treatments (male and female were in half, $P > 0.05$), each treatment was three pigsties, each pigsty had 10 pigs. The control group was fed with basic ration; the test I group was fed with 200g/T PerMicro BC II, the test II group was fed with 500g/T PerMicro BC II, the test period was 27days.

① PerMicro BC can reduce the diarrhea rate of piglets

PerMicro BC II can significantly reduce the diarrhea rate of piglets. Compared with the control group, the diarrhea rate of the test I group decrease by 40% within 10 days (from the beginning of test to the 10th day).

Figure 9. The Effect of PerMicro BC II on Diarrhea Rate of Piglets



② PerMicro BC can improve the intestinal microbes

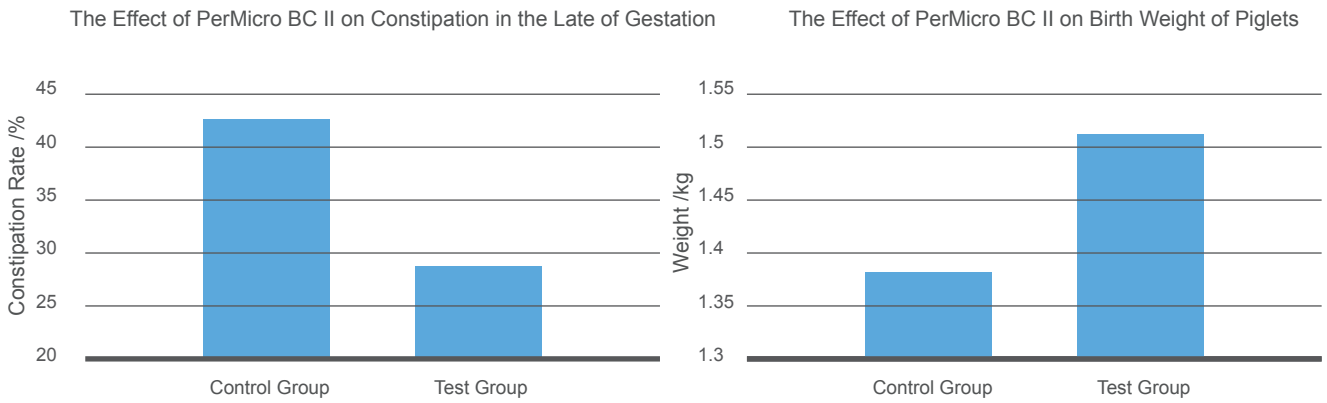
PerMicro BC II effectively improves the number of lactobacillus in feces and reduces the number of Escherichia Coli.

Figure 10. The Effect of PerMicro BC II on Intestinal Microbes of Weaning Piglets

2. The application effects of PerMicro BC II on pregnant sows

200g/T PerMicro BC II added in the diets of pregnant sows effectively reduces the rate of constipation in the late of gestation and increases the birth weight of piglets.

Figure 11. The Effect of PerMicro BC II on Pregnant Sows' Constipation and Piglets' Birth Weight

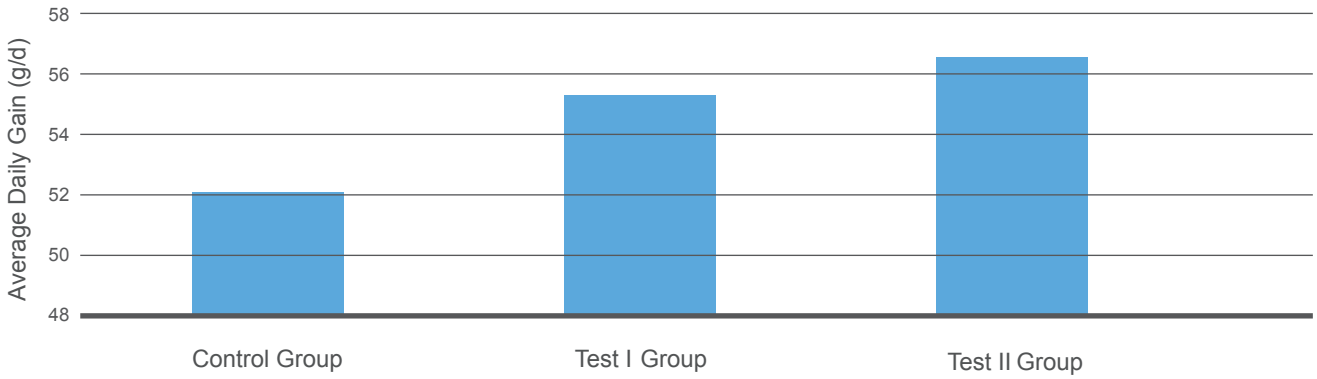


3. The application effects of PerMicro BC II on yellow feather broilers

1-day-old broilers were selected, the number was 1800, they were randomly divided into three groups, each group was 3 replicates and each replicate was 200. The control group was fed with basal diet, test I group was fed with 100g/T PerMicro BC II, the test II group was fed with 200g/T PerMicro BC II, the test period was 65 days.

① PerMicro BC can improve production performance

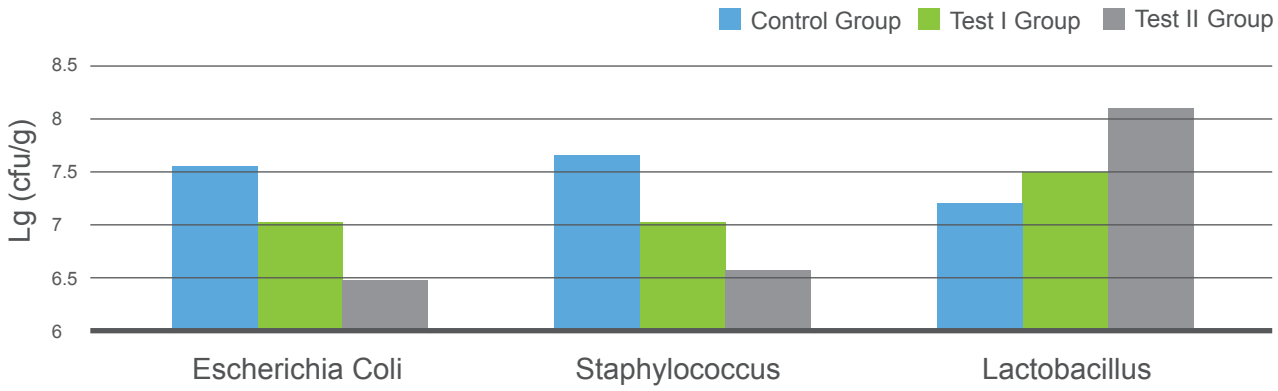
Figure 12. The Effect of PerMicro BC II on Production Performance of Yellow Feather Broilers



② PerMicro BC can improve the intestinal flora structure

PerMicro BC II significantly reduces the number of Escherichia coli in cecum and improves the number of lactobacillus to maintain the intestinal health of animals.

Figure 13. The Effect of PerMicro BC II on Intestinal Flora of Yellow Feather Broilers



Species

This product can be used in pigs, poultry, and aquatic. It especially fits for weaning piglets, sows, growth fattening pigs, meat and laying poultry.

Usage&Dosage

It is recommended to add this product in compound feed, concentrated feeds, and premixes are in proportion to add this product after conversion.

Table 4. The Additive Amount of PerMicro BC in Complete Feed of Livestock

Species	PerMicro BC I (g/T)	PerMicro BC II (g/T)
Piglets	500~1500	300~800
Fattening Pigs	200~1000	100~500
Sows	400~1200	200~600
Broilers	200~600	100~300

NOTE: In order to ensure uniformity in the feed, the use of this product need to be premixed firstly, and then gradually added to the follow-up feed.

This product is used as soon as possible after unpacking, the remaining parts need to tie up and keep in dark place.

Packaging&Storage

This product is packaged in a bag or barrel, the net weight of product is 25kg, and details see the package label.

Keep away from heat, moisture and direct sunlight, not with toxic and harmful substances mixed.

Under the condition of original package, the shelf life is 12 months.

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