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**Keywords:** fermented feed, traditional chinese medicine feed and traditional chinese medicine feed additives, fermented strains, baitouweng soup feed additives, processing technology and equipment requirements.

## I. BACKGROUND OF THE DEVELOPMENT OF ANTI-BACTERIAL SUBSTITUTES SUCH AS FERMENTED FEED AND CHINESE MEDICINE FEED

China's Ministry of Agriculture and rural areas 'pilot Action Plan for reduction in the use of veterinary antimicrobials 2018 -- Prohibition of the use of pharmaceutical feed additives in feedstuffs by 2021 until the end of 2020, and formulated a series of "feed anti-resistance" regulations and "breeding end of anti-reduction, limit anti-" regulations. The harm of drug feed additives and misuse of antibiotics in breeding end has been recognized by people, but some people think that the comprehensive "feed prohibition" will cause the production level of breeding industry to drop, the

breeding cost will increase greatly, and the early stage of "feed prohibition" , on the contrary, the quantity of antibiotics used at the end of breeding increased, and "reducing resistance and limiting resistance at the end of breeding" became empty words. It is believed that anti-resistance will have an impact on animal husbandry: 1 Part of the survival of feed enterprises. Design of feed products. The implementation of the licensed veterinary surgeon system will be speeded up. 4. "Meat Without Resistance" becomes a new selling point. "TIKANG" products to meet the historical opportunities, this huge market space vacated by the "fermented feed, Chinese medicine feed, Chinese veterinary medicine, probiotics, " etc. , the future of these four categories of product manufacturers, operators or become the biggest beneficiaries, will usher in a spurt of growth. 6 The farm pays more attention to the hardware investment in the environment. Therefore, it is very important to develop and reserve alternative products such as fermented feed and traditional Chinese medicine feed. Only when the product of alternative medicine feed additive is mature, developed successfully and reaches a certain reserve amount, "breeding end to reduce resistance, limit resistance" will be achieved.

## II. DEVELOPMENT OF FERMENTED FEED PRODUCTS

### a) Concept and Product Classification of Fermented Feed

The concept of fermented feed: fermented feed refers to the full price feed or feed raw materials added beneficial bacteria for fermentation, beneficial microorganisms through their own metabolic activities, the anti-nutritional factors in plant, animal and mineral substances are decomposed and transformed into higher nutrient and non-toxic feed which is more easily taken up and digested by animals. In pig production, 5-10% is usually added to the Diet.

Fermented feed product classification: divided into three categories: 1 general raw material production of fermented feed: This category is very broad, because can be divided into conventional raw materials of products too many. This category is currently the most used in the field of aquaculture products. Corn meal, wheat bran, soybean meal, cotton meal, peanut meal,

*Author:* Hunan Dongkou County Animal Husbandry Fisheries Bureau, Hunan Shaoyang 422300. e-mail: 961248670@qq.com

palm meal and other fermented feed. 2 Green Plants fermented feed: Green plants are mainly *Broussonetia Papyrifera*, *Opuntia Mori*, whole-plant corn, giant fungus grass, etc. . These plants are rich in nutritional value. After improvement, they are now planted in large quantities, especially *Broussonetia Papyrifera* and *OPUNTIA Mori*, is the national key support project, but this kind of plants do fermentation feed, there are certain limitations, that is, seasonal is strong, must concentrate harvesting and centralized processing, and more suitable for the combination of planting and breeding mode. 3 The fermented feed of the Offal of life: The most common is the fermented feed of bean dregs and distiller's grains, the low-cost raw materials, and the mixed fermented strains are used to make the fermented feed, in fact, it is a kind of recycling of resources, it is a kind of feedstuff with great development prospect.

#### b) Common Key Techniques of Fermented Feed

##### i. Fermentative Strains

Fermentation strains are *Bacillus subtilis*, *Bacillus licheniformis*, antimicrobial peptide *Bacillus*, *Lactobacillus acidophilus*, *Clostridium Butyricum*, *Saccharomyces Cerevisiae*, lactic acid bacteria and so on.

##### ii. Fermentation Substrate and Strain Selection

Singly or in combination. Is Advantageous to the metabolism product production, is advantageous in the digestion, the absorption, is advantageous in the digestion toxic, the harmful or the anti-nutrition material. Strain selection for fermentation substrate on different species of specific requirements: Control Mold Growth, production of antimicrobial substances, taste acid (not just acid), production of enzymes, high acid.

The main ingredients containing anti-nutritional factors are: 1 Cottonseed meal (cake): 1 cycloacrylic acid (egg white turns pink) and (2) Gossypol (free gossypol turns egg Yolk Olive). 2 Rapeseed meal (cake): 1) Sulfur Glucoside, which can be hydrolyzed into harmful substances thiocyanate and ISOTHIOCYANATE, which affect iodine metabolism; 2) myrosinase (eggs produce fishy smell). Flaxseed or flaxseed cake: flaxseed Gum, phytic acid, allergen, cyanogenic glycosides, trypsin inhibitors, anti-VB6 factors, etc. 3 CASSAVA DREGS: CYANOGENIC glucosides (including Linamarin and Stemonidin) can be converted to hydrocyanic acid. Potato (potato) dregs: GLYCOALKALOID (mainly containing Solanine), is an inhibitor of cholinesterase. 5 Sorghum: Tannin Reduces Palatability and Trypsin and alpha-amylase activity, forming a complex with VB12 to reduce VB12 absorption. 6 Palm Meal:-Mannan accounted for about 1 / 3 of the dry weight (NSP), dissolved in water to form a GEL, so that the contents of the digestive tract have a strong viscosity. Strain selection: spore-based special directional screening, strong specificity (for a certain or

several anti-nutritional factors), can degrade protein, fiber and other macromolecules, and produce a wealth of small and medium-sized new molecules. Rich in enzyme and acid production.

Crude fiber rich, medium protein residue bran and other raw materials: 1 Distiller's grains: crude fiber rich, low protein. Brewer's spent grains: good raw materials for dairy cattle, beef cattle and sheep, can be directly t, generally not recommended. 3 CASSAVA DREGS: CYANOGENIC glucoside (Linamarin and Stemonidin) can be converted into hydrocyanic acid. 4 Potato / POTATO DREGS: glycoalkaloid (Solanine), cholinesterase inhibitor. 5 Beet residue: Can Be fermented or not fermented feed pigs (10-25%), cattle, sheep 10-40%. Rice Bran: rich in crude fiber and very low in protein. 7 Rice Bran: rich in crude fiber, low protein, fat. 8 Bran: crude fiber is richer, protein is low, do not deal with commonly, can make water absorbent, ferment auxiliary material. 9 BEAN SKIN: The crude fiber is rich, the protein is low, palatability is poor. 10 Bean Straw: crude fiber is very rich, lignified, low protein. Strain selection: Spore, beneficial fungus mainly. Special Directional screening, strong specificity (degradation of cellulose), can produce acid, enzymes, vitamins, can add auxiliary fermentation agent.

Animal Slaughter and processing by-products: protein-rich, perishable, easily infectious pathogens, heat inactivated raw materials, there are: 1 Aquatic Processing Waste: Viscera, fish scales, skin, head, blood. LIVESTOCK AND POULTRY SLAUGHTER WASTE: Gastrointestinal contents, waste offal. Livestock and poultry blood, feathers: There are professional companies to deal with, raw materials for intense, high-value direction is the production of peptide products. LIVESTOCK AND POULTRY BONES: production of meat and bone meal, a professional company to deal with. 5 Dead Animals: Professional Companies, according to the law, made of meat and bone meal. Common Principles for processing: Hydrolysis by high pressure cooking or drying at 125°C. After cooking, fermentation, select spore, yeast, lactic acid and other complex bacteria plus enzyme hydrolysis.

##### iii. Fermentation Conditions and Process Control

*Fermentation Mode:* Solid State Fermentation (good fluidity). Semi-fluid fermentation (Porridge).

*Fermentation Conditions:* Temperature: 20-45 °C (different bacteria require different). MOISTURE: 20-85% (solid-state fermentation → semi-fluid). AEROBIC/ ANAEROBIC: relating to the species used in the starter culture. TIME: 12-72H.

##### iv. Quality Control and Testing

*Physics:* Ph, color, taste, fluidity, etc. *BIOCHEMISTRY:* Fatty Acids, conventional nutrients (dry basis, fresh moisture), toxins, etc.

characteristics seriously affect the safety: Bacteria and improper storage, 1 week or so moldy.

v. *Technical And Equipment Requirements For Fermented Feed*

*Process flow of fermented feed:* weighing raw material according to formula Crushing → stirring inoculation: fermentative strain → adjust moisture content 50%-60%

→ sealed container → natural fermentation → inspection → fermented feed products.

*Equipment Requirements:* The equipment is fermentation tank, tank, or plastic bucket. The sealed container is used for all kinds of fermentation substrate fermentation.



Figure 1: Factory Production Line of fermenting feed tank

### III. DEVELOPMENT OF TRADITIONAL CHINESE MEDICINE FEED PRODUCTS

a) *Traditional Chinese medicine prescription medicine and traditional Chinese medicine feed additive*

Traditional Chinese medicine mostly comes from nature, with little toxicity and side effect, low residue, reliable efficacy, safe use and high application value 1. Chinese medicine feed additive will replace antibiotic feed additive and play an important role in prevention and cure of animal epidemic disease. Chinese medicine is a treasure trove, such as Li Shizhen's Bencao Gangmu of the Qing Dynasty, 52 volumes, 1.9 million words, a collection of 1,892 Chinese herbs, 1,160 illustrations, and 11,096 prescriptions. Before modern times in China, human and animal plague occurred, that is to say, the Chinese herbal medicine decoction was used to eliminate the 2.

There are many prescription drugs of traditional Chinese medicine, the total effect of preventing and curing diseases is more than 85%. Due to the limited space of this article, the following are just 7 examples of traditional Chinese medicine prescription drug sources, formula plus or minus, treatment (anthelmintic) disease types.

1 Qingre Jiedu Representative Fang Yihuanglian Jiedu Tang Waitai Mi: huanglian 30g, huangqin 45g, huangbai 45g, Gardenia 30g. This prescription can be used for septicemia, Sepsis, dysentery, pneumonia and various acute diseases. Add Dandelion 30G, double flower 30g, folium Isatidis 35g, Radix isatidis 35g, agastache 25g, enhance the antibacterial and detoxification function. (2) the prescription of Xie Xia Representative Fang Yi da Cheng Qi Tang Shang Han Lun: Rhubarb 60 ~ 90g (lower back) , magnolia officinalis 30g, trifoliate trifoliate 30g, mirabilite 150 ~

300G (Chong). Witness fecal constipation knot, abdominal fullness, two will not pass, dry mouth, thick and dry moss, heavy pulse. The addition and subtraction of this prescription can treat constipation in pigs. 3 Yu Jin San (Yu Jin 35g, Huang Qin 35g, rhubarb 30g, coptis 30g, Phellodendron Amurense 30g, Terminalia Chebula 25g, Radix paeoniae alba 25g) to treat damp-heat diarrhea. When hot, should go to Terminalia Chebula, add honeysuckle 30g, forsythia 30g, to heat detoxification.4 Xinliangjie, a representative of Fangyiyinqiao powder, was composed of 30g of Flos Lonicerae, 30g of Forsythia SUSPENSIA, 25g of semen sojiae praeparatum, 25g of Platycodon Grandiflorum, 25g of Schizonepeta Tenuifolia, 30g of Lophatheri, 15g of mint, 20g of Niupanzi, 60g of asparagus root and 10g of licorice root. For the flu, bronchitis, pneumonia. Fever is even, add Gardenia, scutellaria, plaster to heat. 5 for all types of ASCITES junling powder. CODONOPSIS PILOSULA 30g, atractylodes macrocephala 30g, poria 30g, rhizoma alismatis 40g, Ramulus CINNAMOMI 25g, rhizoma atractylodis 15g, radix sophorae flavescentis 20g, cinnamon 20g, Ephedra 20g, Angelica 30g, dried Tangerine 30g.6 Recipe of Leonurus Heterophyllus 60g, Angelica 45g, chuanxiong 30g, taoren 35g, Huangqi 30G, Dandelion 25g, honeysuckle 25g, liquorice 20g. 7 Insect repellent on behalf of Fang Yi areca powder. ARECA CATECHU 24g, cortex Melia Azedarach 18g, fructus AURANTII 15g, mirabilite (lower back)15g, Crane Louse 9G, Rhubarb 9G, 12g. Deworming. This prescription is a relatively safe anti-ascaris agent. If the disease pig constitution is good, may add the thunder pill 9G, enhances drives the ascaris effect.

Traditional Chinese medicine feed additive is made into traditional Chinese medicine feed additive according to the proportion of each traditional Chinese medicine prescription medicine, take 3.3 made

Baitouweng soup feed additive as an example, not one example.

b) *Traditional Chinese Medicine fermented feed and traditional Chinese Medicine Dregs fermented feed*

Chinese Medicine fermented feed: refers to Chinese medicine slices and extracts by-products as substrate, under a certain temperature and humidity, through the inoculation of *SACCHAROMYCES cerevisiae*, *subtilis*, lactic acid bacteria and other strains and complex protease, cellulase, enzymes such as Xylanase make it undergo aerobic and anaerobic fermentation, fully expose the effective components of traditional Chinese medicine, improve its efficacy, and make the anti-nutritional factors in the feed decompose or transform, resulting in more animal feeding, digestion, absorption and higher nutrition, safe, non-toxic feed. Traditional Chinese medicine fermented feed can stimulate the animal's own non-Hapten function, play a disease treatment, disease prevention role.

Chinese Medicine Dregs fermented feed: millions of tons of Chinese medicine dregs are disposed of every year, resulting in huge waste of resources. Because the dregs also contain drug ingredients and nutrients, has not been absorbed by the human body, such as Ginseng, astragalus, Chuanxiong, tuckahoe dregs polysaccharide, glycosides, bases, amino acids, micronutrient remaining 20~30%. The traditional Chinese medicine dregs were collected and fermented to make the traditional Chinese medicine dregs fermented feed. Making fermented feed from Chinese medicinal dregs is the main way for the utilization of Chinese medicinal dregs.

c) *Feeding additives of Pulsatilla decoction as a substitute for medical feed additives in the treatment of piglet diarrhea*

Drug feed additives (products) were previously designed for the prevention and treatment of piglet diarrhea, one is high zinc feed additives (the maximum zinc content in the formulated feed for piglets is 110mg / kg, and the treatment of diarrhea in piglets is increased to 1600mg / kg by zinc oxide or basic zinc chloride), the other is antibiotic feed additives, there are Aureomycin Premix, oxytetracycline calcium premix, bacitracin zinc premix and so on.

"Baitouweng decoction" was first published in the treatise on Febrile Diseases. Jue Yin Chapter, it is composed of 4 herbs: *Pulsatilla Chinensis*, *Cortex Phellodendri*, *Rhizoma Coptidis* and *CORTEX Fraxini*. *Pulsatilla Chinensis* can clear away heat and toxin, cool blood and treat dysentery. The combination of the four herbs can clear away heat and detoxication, cool blood and stop dysentery. 3, the prescription: *Pulsatilla Chinensis* 60g, *cortex phellodendri* 45g, *cortex fraxini* 45g, *Rhizoma Coptidis* 45g, treat the damp-heat diarrhea caused by large intestine heat toxin injury in

blood. Its main components are alkaloids, coumarins, saponins. The combination of Baitouweng decoction and antipyretic and antidotal drugs can decrease the endotoxin of *E. Coli*, increase the blood viscosity, shorten the prothrombin time and increase the Hematocrit 4. *Pulsatilla* contains triterpene saponins, triterpene acids, Lignans, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *pulsatilla Chinensis*, *Dauconin* and *Glycoprotein*. The different extracts of *Pulsatilla Chinensis* and the composition of *Pulsatilla Chinensis* decoction have bacteriostatic effect on *Staphylococcus Aureus*, *Escherichia Coli*, *Pseudomonas Aeruginosa* and *paratyphoid Bacillus* 6.

*According to the formula of Baitouweng decoction:* Baitouweng 60g, *cortex phellodendri* 45g, *cortex fraxini* 45g, *Rhizoma Coptidis* 45g, *semen Plantaginis* 35g, *tuckahoe* 25g, *rhizoma atractylodis* 25g each, 280g subtotal. Baitouweng Soup Chinese medicine feed additive was confected by percentage: Baitouweng 21.4% (6028000.214,0214100% 21.4%, same as below), *cortex phellodendri* 16.1%, *cortex FRAXINI* 16.1%, *rhizoma COPTIDIS* 16.1%, *rhizoma plantaginis* 12.5%, *poria* 8.9%, *RHIZOMA ATRACTYLODIS* 8.9%. Used to replace antibiotics, antibiotics feed additives and *PULSATILLA* decoction prescription medicine.

How effective are *pulsatilla* decoction and *Pulsatilla* decoction feed additives in treating piglet diarrhea? Can baitouweng soup feed additive replace antibiotic, antibiotic feed additive and Baitouweng Soup prescription drug? Therefore, the author designed and carried out a test to treat piglet diarrhea, using *Ofloxacin* injection treatment group as control group, Baitouweng decoction prescription drug treatment group as group I, 15% Baitouweng decoction feed additive group as Group II, 10% baitouwengtang feed additive group III was used to treat diarrhea piglets in order to confirm whether Chinese medicine feed additive can replace antibiotics and Chinese medicine prescription. From December 2, 2018 to February 27, 2019, 50 pigs in each group were tested in Dongkou Jiajing Agriculture and Animal Husbandry Co., Ltd. (7000 pig farms). The results are shown in Table 1.

**Table 1:** Therapeutic effect of ofloxacin, pulsatilla Chinensis and Pulsatilla Chinensis on piglet diarrhea in Dongkou County

	Control Group	Group I	Group II	Group III
Treatment head count	50	50	50	50
Number of heals	47	46	45	40
Cure rate%	94.0	92.0	90.0	80.0
Average number of days cured	2.8	3.3	3.6	4.5
Drug expenditure (per head / Yuan)	12.4	11.6	10.9	9.8

The results showed that the cure rate of Group II was 90.0% , and the average cure time was 3.6 days, the cure rate of Group II was 94.0% , the average cure time was 2.8 days, the cure rate of group I was 92.0% , the average cure time was 3.3 days, the difference was not significant (P & GT; 0.05) , the results showed that 15% BAITOUWENG decoction could replace the prescription of Ofloxacin and Baitouweng decoction, the cure rate of Group II was 80.0% and the average cure time was 4.5 days, the difference was significant (P & Lt; 0.05) , the results showed that the 10% Baitouweng decoction with feed additive was too little to reach the prescription dosage of Baitouweng decoction, which affected the therapeutic effect. Therefore, 10% baitouweng soup feed additives can only be used as a preventive amount, treatment of 15% to 20% (add 15-20%), in order to achieve the Baitouweng soup prescription drug treatment effect.

#### IV. CONCLUSION

It is still in the research and development stage at present. Although there are many commercial products on the market, because of the late start, new subjects, the theoretical research, feeding experiment and practical application of fermented feed should be strengthened. Therefore, with the advent of the era of prohibition and resistance, agricultural colleges and universities have strengthened the education of fermented feed, Chinese veterinary medicine and Chinese medicine feed for undergraduates, and strengthened the on-the-job training for livestock workers, vocational Training and knowledge updating education of fermented feed and traditional Chinese medicine feed are very important.

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