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RESEARCH ARTICLE

RESEARCH ON POULTRY CASTINGS RECYCLING BASED ON GREEN CONCEPT

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ABSTRACT

Green concept is a design concept and method based on saving resources and protecting the environment, paying attention to the protection of natural ecology, making full use of resources, putting people first and protecting the environment (Zhaofu Hong *et al.,* 2019). The content of the green concept can be said to be a new social and economic development mode that takes environmental protection as an important support for sustainable development under the condition of restricting the capacity of ecological environment and resource carrying capacity (Allenby and Fullerton, 1991). Including the following points: (Allenby and Fullerton, 1991; Deming, 1982) First, we should take environmental resources as the internal cause of social and economic development. Second, to achieve sustainable economic, social and environmental development as the goal of green development (Kaufmann, 2015). Third, "greening" and "ecologicalization" of the process and results of economic activities are taken as the main content and approach of green development. From these points, the green concept puts forward three requirements: (Kaufmann, 2015; Ivan Bergier *et al.,* 2019) First, environmental resources should be fully considered in the design of recycling (reproduct); (Ivan Bergier *et al.,* 2019). The second is to form a cycle, so that the production of goods after the completion of the function can become renewable resources (recycling) (Kamphuis *et al.,* 2015). It requires less input of raw materials and energy to achieve the established production or consumption purposes, thus paying attention to resource conservation and pollution reduction at the source (Andretta *et al.,* 2016b). All three principles focus on the environmental impact of products. In order to achieve the green concept, there are many methods to study and implement, the important is in the design stage, with green design as the initial purpose of engineering design (Hao *et al.,* 2014). Including green structure design, green energy design, green packaging design, green manufacturing process design. From the perspective of energy conservation and pollutant management, the green development of the capital is measured according to people's willingness to live in a green environment (Holt and Barnes, 2011). The specific content is the production energy consumption and urban pollutant treatment rate. Today, with the rapid development of social and economic development, (Li *et al.,* 2016) environmental protection theory is deep in people's minds, animal husbandry is widely used, is a green concept to protect the environment, save a kind of livestock and poultry castings reuse. Feedstuff is the most important material in the development of animal husbandry (Martinez *et al.,* 2009). It is difficult to continue using a large amount of grain to increase livestock production in order to increase livestock production. Therefore, it is not an important issue to develop the feed resources for the extensive utilization of feed resources. On the basis of green ideas, this paper discusses the recycling problem of poultry castings.

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INTRODUCTION

Poultry castings treatment status: It was determined that the average fecal production per adult laying chicken was 103g/ day, and the flushing water was 300g/ bird (Steinfeld and Gerber, 2010). The annual excrement of 1,000 chicken farms is 36t. In a million chicken farm, the annual output of chicken castings is 360t. An industrial chicken farm with 100,000 chickens produces more than 3600t of chicken feces per day every day. Chicken feces has contain large amounts of organic matter and rich NPK nutrients such as the complex nutrients including eutrophication material such as ammonia and phosphorus ammonia hydrogen sulfide methylamine methane, methanol dimethyl sulfide odorous gases such as iron, zinc manganese cobalt iodine mineral elements such as copper metal material such as arsenic, mercury selenium antibiotics hormones such as antioxidants of veterinary drug residue (Buller *et al.,* 2015; Alkemade *et al.,* 2013). These poultry castings in the countryside, through the urea and quicklime fermentation process, non-toxic, become organic fertilizer (Bouwman *et al.,* 2013). However, according to engineering regulations and the modernization of equipment, the spread of unprocessed waste into the ground may cause soil pollution.

Nutrient contained in poultry excrement: The excrement of poultry is rich in nutrients. The content relates to the variety and age of poultry, the level of specifications, the type of feed,

and the processing of poultry excrement. Pure protein undigested in chicken castings is 13.1% ~ 18.7%, Crude protein 23.3 ~ 32.2%, Crude fat 9 ~ 10%, non-nitrogen extract 22 ~ 46%, the crude protein content is not digested in the bovine castings is 11.9%, crude fat 25.6%, the non-nitrogen extract is 27.3 ~ 28.5%, and the crude protein is 17.4%, crude fat 8 ~ 24.3%, non-nitrogen extract is about 37%.

Nutritional ingredients Product Type	Pure protein (%)	Crude protein (%)	Crude fat (%)	Non-nitrogen extract (%)
Chicken	13.1~18.7	23.3~32	9~10	22~46
Cattle	7.8~8.8	11.9	25.6	27.3~45.8
Pig	10.5~12.3	17.4	8~24.3	37~38.3

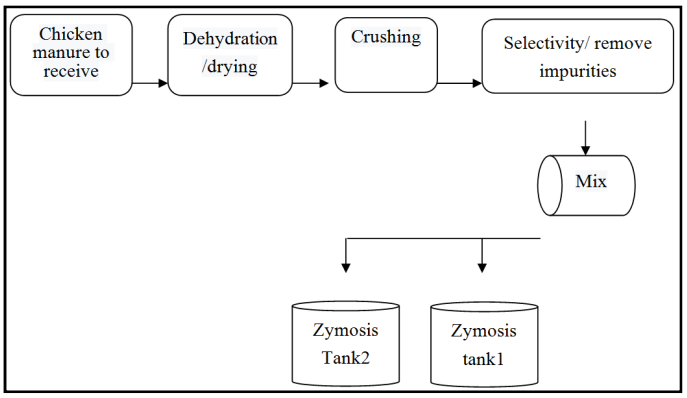
In addition, animal waste contains a variety of vitamin B, especially vitamin B12 (Bartzanas *et al.,* 2015).

Reuse of chicken castings

Feed the excrement of poultry: Due to the physiological characteristics of poultry, the castings of chicken contains more nitrogen and more nutrients than that of other livestock. Actually, because the excrement and urine of fowl exceeded the silky nutrition material that grain feed place contains, pass proper treatment and processing, raise value to be able to rise (Pomar *et al.,* 2014). The crude protein in chicken castings is more than 3.45 times that of corn, so it is of high value as feed This shows that livestock waste can be used as a substitute for livestock feed. There have been many experiments with livestock castings as feed. Chicken castings as feed to go through a certain treatment engineering. The moisture content of early chicken castings is very high. It should be dried to control its moisture content below 10%. The purpose of dehydration is to make the handling and management of chicken feces comfortable, effectively inhibit the microbial activity contained in feces, and prevent the loss of nutrients (especially protein). Dehydration and drying methods include natural drying, high temperature drying, heating drying, micro drying, etc. In addition, there are drying methods and fermentation methods.Different from dehydration, fermentation has the advantages of low energy cost and easy utilization. Under the special physical and chemical effects formed in the fermentation process, the pathogenic microorganisms in chicken castings are relatively eliminated. Under the action of various microorganisms, the organic components in chicken castings are decomposed to improve the utilization rate of organic compounds. The methods of fermentation include anaerobic fermentation and oxygen-supplying fermentation. The most common method is oxygen-supplying fermentation. The advantage of oxygen-fed fermentation is that the fermentation effect and speed are fast, which can effectively kill harmful bacteria and reduce the loss of nutrients.

MATERIALS AND METHODS

Chicken castings water content reduced by about 43%, the temperature is guaranteed at about 22 ℃. Then add yeast to ferment. Hydrogen sulfide and other harmful gases are produced due to the reproduction of bacteria and temperature. After the mixing process of gas drying, made into powder feed. In addition, can still use green grass feed to store up a method, regard chicken muck as feed. The raw chicken feces with the removed impurities were adjusted to be about 60% water content, 50% feces and urine, about 35% corn stalk, and 23% rice or bran. The feces were sealed in a container and fermented for 20-28 days. The chicken castings forage production project is simplified by industrial methods as follows:



Picture 1. Progress of chicken castings forage production project

Feed pig with chicken excrement, 40% of daily consumption can improve the digestibility of 70% or so. Mix the amount of food of a day with dry excrement, feed pig and chicken, can raise digestibility, stimulative growth grows. The feces of young chickens were treated with clove compound bacteria and mixed with basic food to feed 20% ~30% to pigs. The average weight gain rate of pigs was over 630 grams per day. Within 95 days, the average weight of a pig per cow increased to more than 75.3 kg, with no disease and normal development. In the case of meat cows, even if 40% of the day's feed is added as fermented food, the gain rate and quality of the cattle will not be affected. About 25~30% chicken castings feed was added to dairy cows daily.

Turn poultry castings into organic fertilizer: Direct fertilization of chicken castings due to its high water content can exceed the occurrence of diseases and insect pests, and its use is restricted. However, the organic fertilizer of chicken castings made by fermentation not only contains active and beneficial bacteria, but also has the components of effectively resisting diseases and insect pests, and has the advantage of strengthening the cold tolerance of crops. Chicken castings organic fertilizer can enrich the soil, promote the growth of trees, than fertilizer safety, high efficiency, much more expensive.

Conclusion

The world food problem is still very difficult, but the demand for meat, eggs, milk and other livestock products has not decreased, this situation urgently requires new development of animal husbandry. In order to cope with the world food crisis and ensure the sustainable development of animal husbandry, the research on finding new feed sources and using feed substitutes will become more and more active. At the same time, animal husbandry development and the lack of feed research work, research to the production of safer, better quality animal products. From the perspective of the green concept, the utilization of livestock waste as feed in the livestock sector is also a significant and important issue. In order to realize the green environment of the pasture and ensure the sustainability of the feed production, it is necessary to deepen the research on the processing and manufacturing, preservation and feeding management of the excreta of livestock products, deepen the research on the harmful substances contained in the excreta, the harmless treatment of

bacteria and so on to improve the utilization rate of the excreta of livestock products. In today's world, green development has become an important trend. Green development is a mode of economic growth and social development aiming at high efficiency, coordination and sustainability. Each of us should work together to save energy and promote a low-carbon economy.

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