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음식물쓰레기의 사료화

Treatment of Kitchen Food Waste for Animal Feed

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1. Introduction

The solution for the environmental problems has been the hot topics nowadays all around world. The treatment of kitchen food waste becomes the urgent project to overcome by Korea. The kitchen food waste in Korea holds large amount of moisture inside and can be deteriorated easily and makes odor problems. And also it is difficult to collect from each household. Therefore the recycling rate of kitchen food is Limited. The recycling methods of the food waste are to make fertilizer and animal feed basically. The animal feed can be obtained by drying the food waste by a dryer and the fertilizer can be produced through the composting processes. But the fertilizer produced normally contains large amount of salt inside and has an adverse effect on the soil for crop production.

Therefore the animal feed from the kitchen food waste could be the most adequate recycling method for the treatment of kitchen food waste in Korea. But the simply drying and feeding method is not accepted to the animal farms because of low feed efficiency. So the methods which can treat the kitchen food waste safely and improve the efficiency of animal production are needed to develop.

The objective of this research is to develop the system which can treat kitchen food waste safely and produce the fermented animal feed which can be used animal farm without considering extra mixing. Specifically to design the system for treatment of kitchen food waste and to produce the feed by the system designed, and to evaluate the feed by feeding trial to the pigs were conducted.

2. Material and Methods

The system of machine unit which can produce the fermented animal feed for direct supply to the farm was configured and drawn in detail in Fig. 1. The feed was produced by the machine unit designed and tested for the feed efficiency of pigs.

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A. Design of production system

The system shown in Fig.1 has the capacity of 50 ton/day and used kiln type dryer and vacuum dryer. The system can dry and ferment food waste safely.

The process includes;

(1) Pretreatment of food waste (Fig.2)
(2) Removal of moisture content down to 30% by Kiln dryer (Fig. 3)
(3) Formulation for the complete feed
(4) Removal of microbe and fermentation (Fig. 4)
(5) Pellet feed (Fig. 5)

B. Feeding trial

Feeding trial was conducted to study the effects of drying only and drying to fermentation of kitchen food waste on growth performance, nutrient digestibility and pork quality in growing and finishing pigs. Total of 117 growing pigs (Landrace × Yorkshire × Duroc, 54.8±4.6 kg) were randomly assigned to three dietary treatments: 1 - control diet, 2 - diet 20% dried food wasted and 3 - diet including 20% simply dried fermented food waste. Control diets for feeding trials were formulated to contain 3,300 kcal ME/kg, 16.5% crude protein and 0.95% lysine. Dietary treatments 2 and 3 contained the same levels of all nutrients as those of control dietary. All treatments were pelleted. For digestibility trials, dietary treatments contained 0.25% chromic oxide as an indicate marker. Each treatment was replicated 3 times with 13 pigs per pen. Feed and water were offered for *ad libitum* consumption.

3. Results and conclusions

A. Design of system

The plant to process food waste was designed and specific scale for the 50 ton/day was also suggested. The moisture content and mass balance were tabulated and the power requirements for each machine unit are also listed. The figures of the production unit were included.

B. Feeding trial

There was a significant difference ($p<0.05$) between control and the other treatments in average daily gain but not in average daily feed intake and feed conversion rate. The test results from control diet are better than those from diet with food waste on nutrient digestibility, gross energy, crude protein, and calcium. But there was no difference between simple dried food waste diet and simple drying with fermented waste food diet on nutrient digestibility. In pork quality, there was no significant difference ($p<0.05$) on dressing percentage, backfat thickness, loin eye area, fat free lean index, drip loss, TBARS, pork color and marbling. Adding 20% waste food in simple dry or fermentation processed form reduced average daily gain and has no adverse effect on pock quality.

4. Summary

The animal feed could be the most adequate recycling method to treat kitchen food waste in Korea. The system to treat kitchen food waste safely and produce fermented animal feed was developed and used to produce the feed to evaluate the quality by feeding trial to pigs. The system has capacity of 50 ton/day and consists of kiln type dryer and vacuum dryer. Feeding trial was conducted to study the effects of drying only and drying with fermentation of kitchen food waste on growth performance, nutrient digestibility and pork quality in growing and finishing pigs. There was a difference between control and the other treatments in average daily gain but no difference in average daily feed intake and feed conversion rate. The control diet is better than those included kitchen food waste on nutrient digestibility, gross energy, crude protein, and calcium. But there was no difference between methods how to treat kitchen food waste on nutrient digestibility. In pork quality, there was no difference on dressing percentage, backfat thickness, loin eye area, fat free lean index, drip loss, TBARS, pork color and marbling. Addition of kitchen waste in animal feed reduced average daily gain but no adverse effect on pock quality.

5. References

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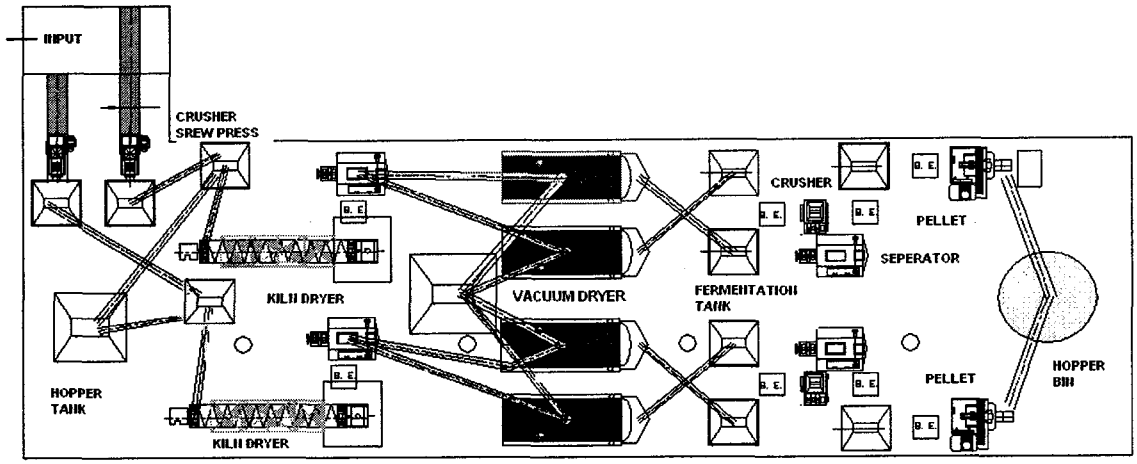

Fig. 1. Layout of Treatment System for Kitchen Food Waste

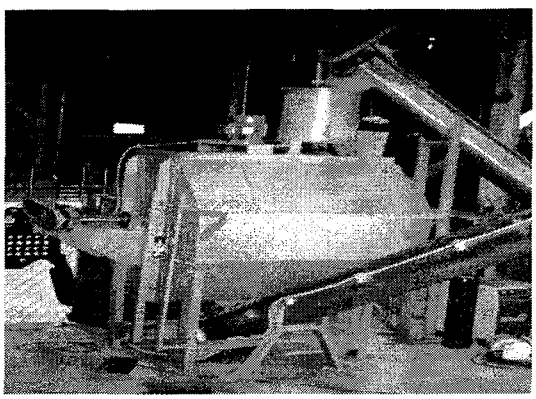

Fig.2 Separator

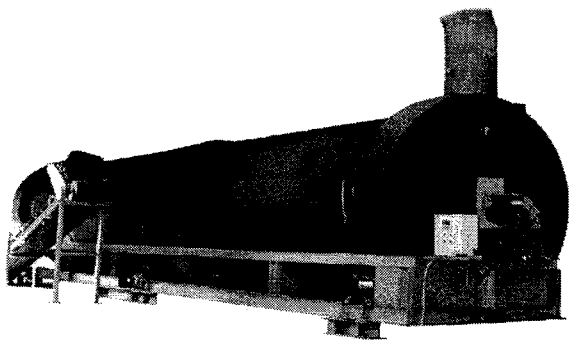

Fig.3 Kiln Dryer

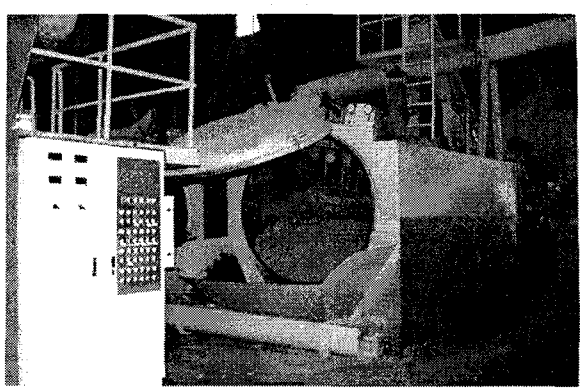

Fig.4 Vacuum Dryer

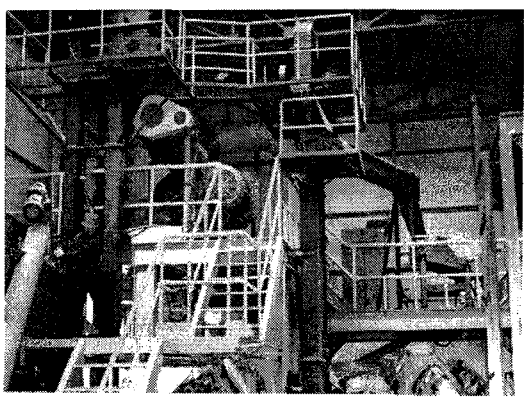

Fig.5 Pellet Machine