

Utilization of Poultry Waste and Shochu Distillery By-product Fermented with Indigenous Microorganisms as Feed Resources for Pigs and Cattle

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Introduction

In the southern part of Kyushu, Japan, dung urine of farm animal, as well as shochu distillery by-product, are often thrown away to the underground or into the sea. But there is also an interest in solving these problems in a more environmentally friendly way and in a way that makes more effective use of these resources. In this study, these area-organic-resources were fermented with indigenous microorganisms (IMO)¹⁻²⁾ and a preliminary examination was made by recycling these resources in order to feed pigs and cattle.

Material and Methods

Experiment 1.

Three kinds of fermentation feed A, B and C were produced (Table 1). To produce feed, resource recycling equipment with ability of heating, decompressing and shuffling was used. A, B and C feeds were adjusted with IMO and fermented using the recycling equipment.

Three mini pigs were bred in a cage and their taste preferences for fermented feeds A, B and C were examined using turning-over breeding method for 3 days.

Experiment 2.

One kind of fermentation feed was produced (Table 2). The manufacture of the fermented feed was shown in experiment 1.

1. Three cattle were used in this experiment. Fermented feed was mixed at the rate of 0, 30, 50, 70 and 100% in the feed during the first half of the fattening stage, and five kinds of experimental feed were made. Five kinds of feed were changed after every 2 days from the feed with the combination from 0 to 100%, and quantity eaten was measured every day.
2. Three cattle were used. Fermented feed was mixed at the rate of 30, 40 and 50% in the feed during the first half of the fattening stage, and three kinds of experimental feed were

made. Three kinds of feed were changed after every 2 days from the feed with the combination from 30 to 50%, and the intake was measured every days.

Table 1. The combined contents of the fermented feed used for the taste examination of pig

Combined raw materials	Fermentation feed		
	A	B	C
	(%)	(%)	(%)
Poultry waste	32	24	16
Shochu distillery by-product	20	20	20
Forest topsoil	24	24	24
Rice bran	12	12	12
Concentrated feed	12	20	28
Indigenous microorganisms (IMO)	(1.6)*	(1.6)*	(1.6)*
Fermented plant juice (FPJ)	(0.8)*	(0.8)*	(0.8)*
Fish amino acid (FAA)	(0.8)*	(0.8)*	(0.8)*
Lactic acid bacteria serum (LABS)	(0.8)*	(0.8)*	(0.8)*
Extracted Shirasu solution (ESS)	(0.8)*	(0.8)*	(0.8)*
Marine plant juice (MPJ)	(0.8)*	(0.8)*	(0.8)*
Rice hulls charcol (RHC)	(0.8)*	(0.8)*	(0.8)*

* : () The figure shows the rate for the main combinations of raw materials used.

Table 2. The combined contents of the fermented feed used for the taste examination of cattle

Combined raw materials	Combination rate
	(%)
Poultry waste	13.6
Shochu distillery by-product	50.0
Rice bran	36.4
Indigenous microorganisms (IMO)	(0.23)*
Fermented plant juice (FPJ)	(0.23)*
Fish amino acid (FAA)	(0.23)*
Lactic acid bacteria serum (LABS)	(0.23)*
Extracted Shirasu solution (ESS)	(0.23)*
Marine plant juice (MPJ)	(0.23)*
Rice hulls charcol (RHC)	(0.23)*

* : () The figure shows the relation between the whole and the main raw material combinations.

Results and Discussion

The amount of intake by pigs for the three kinds of fermented feed (A, B and C) is shown in Figure 1. As for the amount of intake of fermented feed, significant difference between feeds was not found. Also, within three pigs, no significant difference was found between two of them in terms of the amount of intake of fermented feed. However, in one pig, amount of intake declined significantly, as the amount of thick feed increased. Therefore, the feed made of poultry waste, shochu distillery by-product, forest topsoil and IMO had the highest quality as the feed for pig when fermented.

The result of the taste experiment 2-1 using fermented feed mixed with the fattening cattle feed during the first half of fattening period is shown in Figure 2. As the mixing rate of the fermented feed in the fattening feed increased, the amount of intake declined sharply, and became nearly zero at the rate of 40% mixture. However, in experiment 2-1, cattle did not eat fermented feed before experiment. Therefore, no conclusion could be drawn whether combination rate from 30 to 50% was a proper for the cattle to become acclimated to fermented feed in their breeding feed. Furthermore, a spare breeding period was provided for this for 1 week before experiment 2-2.

The result of this taste experiment using the fermented feed mixed with the fattening feed during the first half is shown in Figure 3. A difference in quantity of feed intake was seen among individual cattle. The quantity of intake by two in three cattle did not admit significant difference. Quantity of intake increased in one cattle, as the rate of fermented feed increased. Therefore, in the case of cattle, IMO processed and fermented feed did not show to

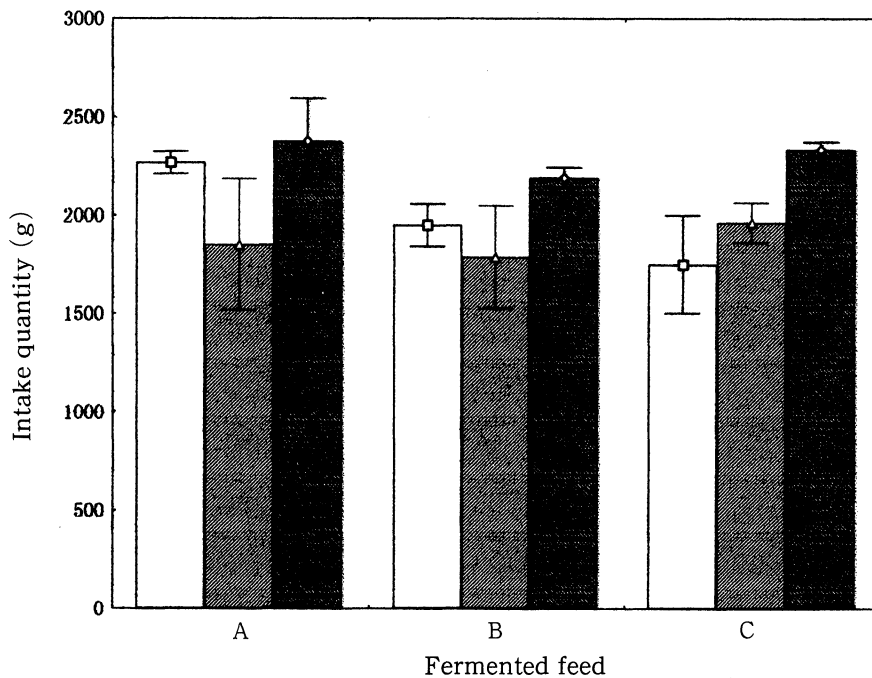


Fig. 1. The difference in feed intake/day for fermented feed and pig.

□ Pig 1 ▨ Pig 2 ■ Pig 3

be of good taste to the pig. But, if the cattle became acclimated to fermented feed, it was supposed that the fermented feed for cattle can be used for pig.

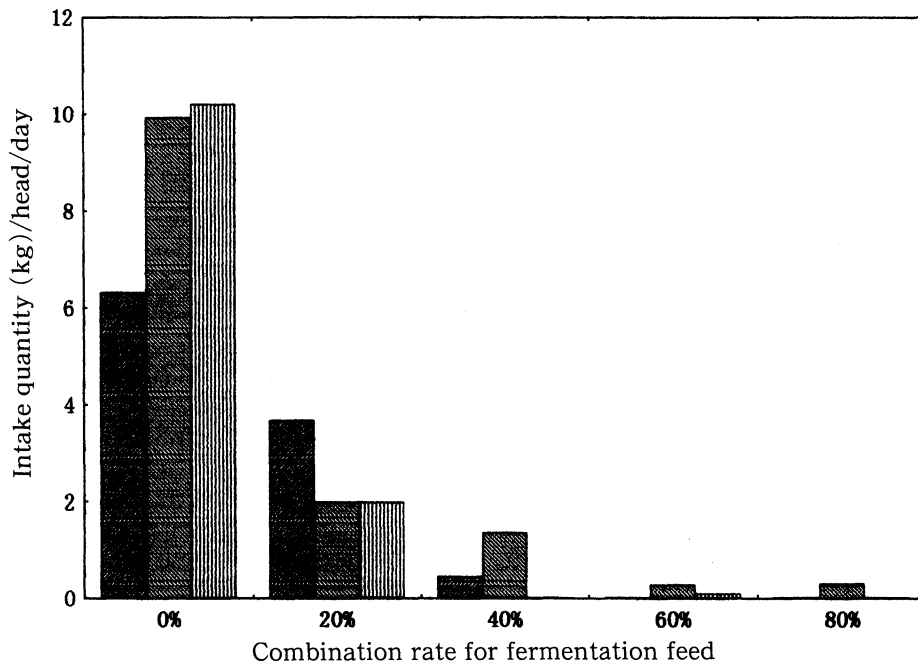


Fig. 2. The differences of feed intake quantity of fermented feed by combination rate.

■ Cattle 1 ▨ Cattle 2 ▤ Cattle 3

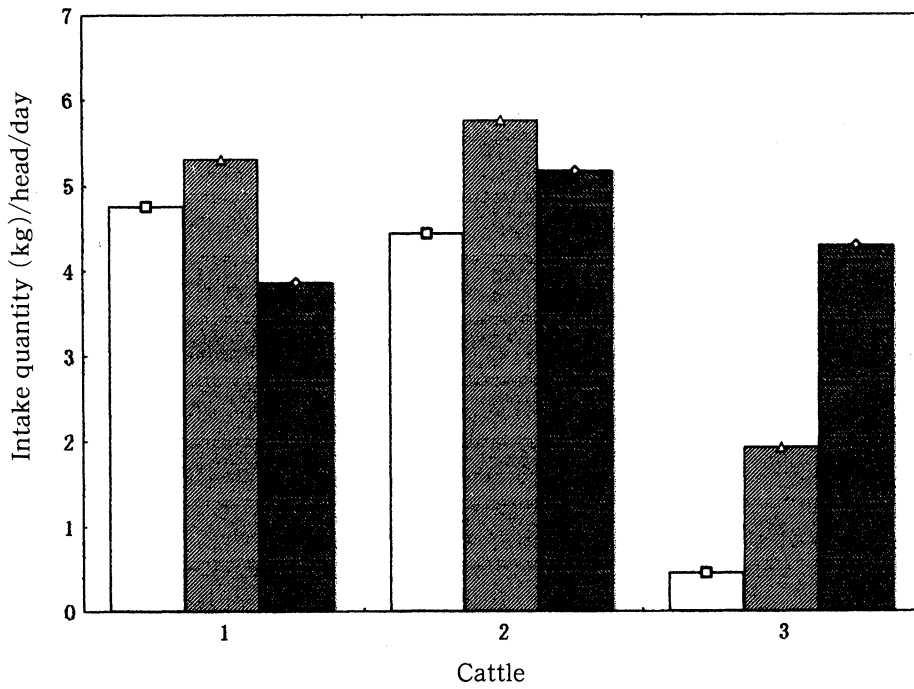


Fig. 3. The influence of fermented feed combination on feed intake.

□ 30% ▨ 40% ■ 50%

References

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Summary

The feed produced from the poultry waste, shochu distillery by-product and topsoil from the forest mountain soil were used as the main raw materials. They were processed and fermented with IMO. The fermented feed was examined in terms of taste preference using the turning-over method with three mini pigs. The feed produced from the shochu distillery by-product, rice bran and poultry waste were used as the main raw material and were also processed and fermented with IMO. Then they were examined in the terms of taste using the turning-over method with three Japanese Black cattles.

The results obtained were as follows :

- 1) The feed produced from the poultry waste, shochu distillery by-product and topsoil tasted good to the pig, and the utilization of using them as feed for the pig were acknowledged.
- 2) The feed produced from the shochu distillery by-product, rice bran and poultry waste as the main raw materials, and processed and fermented with IMO tasted good to the cow. The utilization of using them as feed for the cattle were acknowledged.