Application of Technology for Processing Rice Straw as Feed for Beef Cattle

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Abstract. The objective of this study was to apply the processing of technology for rice straw as cattle feed at smallholder beef cattle farms in supporting the integration between beef cattle and paddy. The study was conducted in smallholder beef cattle farmer groups, in Makkawaru Village, Mattirobulu Sub-District, Pinrang Regency, South Sulawesi, Indonesia. In general, the application of rice straw fermentation technology showed an increase in the quality of rice straw. Quality of crude protein of fermented rice straw was increased in comparison to unfermented one, and it was followed by a decrease in crude fiber content after fermentation.

Keywords: feed technology, rice straw, cattle-paddy integration

1. Introduction

Integration of beef cattle with paddy is the best strategy to improve the optimization of resource utilization of agricultural waste, but this effort have not been implemented properly, because its implementation is still done on a partial, not integrated and holistic. The main technology components that need to be controlled by farmers in the system integration of beef cattle and grain namely waste treatment technologies so as to embody the principle of zero waste [1]. The main constraint in the utilization of waste in the system integration is still not taken into account for rice straw waste as a feed. The number of farmers that have knowledge regarding feed technology is high enough (54.80%), however the application of this technology was low (11.62%). Beside that, the farmers have not been utilize yet the livestock waste such as feces optimally as a source of alternative energy (biogas) and production inputs (fertilizers) for farming, so the principle of integration has not been yet achieved [2].

Based on this condition, it is required an effort to optimize the utilization of rice straw as feed for beef cattle in order to support integration between beef cattle and paddy, and in turn, the sustainability integration could be achieved through the application of treatment technology, such as processing rice straw as feed. Therefore, the current study aimed to apply the processing technology of rice straw as feed for beef cattle in the farm-level in supporting the integration between beef cattle and paddy, and in turn, the optimal resource management to improve productivity and increase the farmer's income by the presence of added value which is obtained upon application of wastewater treatment technology of rice straw as feed for beef cattle can be achieved.

2. Materials and Methods

The study was carried out in the farmers cattle in the village of Makkawaru, Mattirobulu sub-district, Pinrang District, South Sulawesi, Indonesia. The material used was rice straw obtained from the location where the study was taking place, and of extra material in fermentation was a starter microbes; starbio. The process for fermentation was preceded by preparing the place of fermentation at once serves as a stockroom of feed. Fermented rice straws with probiotics starbio in pitch of the scale, with the use of starbio standard and urea each 0.6 % of the weight of rice straw [3].

The procedure for fermentation was accumulate rice straw approximately 30 centimeters first and if necessary, the straws was press down then sprinkled with starbio, and urea then added by water to maintain the moisture of 60%. This stage repeated to reach a height of rice straw of 1.5 meters. A stack of the straws was incubated for 21 days without any treatment. After 21 days, the
straws were then dried by simple aeration. Variables observed were crude protein, crude fiber, ether extract, ash [4], neutral detergent fiber, acid detergent fiber, cellulose, lignin [5]. The data was analyze using t-student [6].

3. Results and Discussion

Results technology applications processing rice straw through technology fermentation are showing in Figure 1, in general showed that there was an increased occurrence of the quality of rice straws after conducting the technology processing. Average the quality of rice straw fermentation is shown in Table 1.

![Figure 1. The implementation of the application technology of fermentation of rice straw](image)

Table 1 shows that the quality of protein of rice straw fermented (9.17%), increased and significantly differred from unfermented rice straw (4.12%). Crude protein levels of fermented rice straw increased and followed by decreased crude fiber before fermentation (41.23%), and after fermentation (34.25%). Microbial starter containing proteolytic enzyme-producing microbial proteases can overhaul the protein into polypeptide which subsequently became simple peptides. For the composition of rice straw fiber without real fermentation was higher than with rice straw that had been fermented. The use of microbial starter lowered the levels of cell wall (NDF) of the rice straw [7].

Therefore, it can be presumed that during the fermentation period, the bond of lignocellulose hemicellulose of rice straw were break down. Lignolitik microbe in microbe starter helped to break the lignocellulose bond resulting the cellulose and lignin could be detached from the bonds by the enzyme lignose. This phenomenon is seen with decreased the content of cellulose and lignin of rice straw fermented. Decreased levels of lignin decomposition occurred during fermentation indicates the bond of lignin and hemicellulose.
Table 1. The average of nutrients quality of rice straw without fermenting and fermented with a
starter of microbes

<table>
<thead>
<tr>
<th>Nutritive Values (% dry matter)</th>
<th>Rice Straw without fermenting</th>
<th>Rice Straw fermented with a starter of microbes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein</td>
<td>4.12&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9.17&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Crude fibre</td>
<td>41.23&lt;sup&gt;a&lt;/sup&gt;</td>
<td>34.25&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ether extract</td>
<td>1.18&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.54&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ash</td>
<td>22.34&lt;sup&gt;a&lt;/sup&gt;</td>
<td>20.19&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Neutral detergent fiber</td>
<td>72.52&lt;sup&gt;a&lt;/sup&gt;</td>
<td>69.22&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Acid detergent fiber</td>
<td>57.76&lt;sup&gt;a&lt;/sup&gt;</td>
<td>47.64&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cellulose</td>
<td>34.03&lt;sup&gt;a&lt;/sup&gt;</td>
<td>26.72&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Lignin</td>
<td>8.13&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.96&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
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</table>

Different superscript letters to significant differences (P<0.05)

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