Nutritive value of banana stem with applicative technology *Trichoderma* sp. as ruminant feed

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**Abstract.** Ruminant livestock production is highly dependent on the availability of feed. The problem in ruminant production in Indonesia is the difficulty of meeting the continuous availability of feed especially the dry season. Banana stem is an alternative feed for ruminant a lot of but low in nutrition content. The aim of this study was to determine the content of nutritive value of banana stem treated with applicative technology *Trichoderma* sp. as ruminant feed. The experimental design was used a completely randomized design (CRD) with 3 treatments and 3 replications. The level of *Trichoderma* sp., namely 2.5%, 5.0% and 7.5%. The stem of banana was incubated during two weeks. Analysis of variance showed that the level of *Trichoderma* sp. not significantly effect (P > 0.05) on crude protein and neutral detergent fiber (NDF). The higher levels of *Trichoderma* sp. tendency increased content of crude protein and decreased of NDF.

1. **Introduction**

Meat self-sufficiency continues to be pursued to meet the needs of animal protein in Indonesian society. Ruminant livestock as a producer of meat and milk productivity needs to be improved. Feed is a very important role both in quality and availability to support livestock productivity.

Potential local resources that can be used as feed are banana stems, which are currently not widely used and are just thrown away. Banana plant have growing in the territory of Indonesia. The harvest age depends on the variety of banana plants. Banana plants that are widely planted are Kepok bananas, Ambon bananas, Lampung bananas, Golden Bananas and other. After the fruit harvested the banana stems are left and become rubbish, the amount of which is quite large, namely 60% of the banana plant.

Banana stems have nutritional value as an energy source that still needs to be improved as feed quality. The nutritive value of banana stem was crude protein 4.81%, crude fiber 27.73% and extrac ether 11.23% [1]. Biological feed processing using *Trichoderma* sp. of banana stems need to be improve for their nutritional value.

2. **Materials and methods**

2.1. **Materials**
The main material in this research was used banana stem from Tamalanrea Makassar South Sulawesi. Fungi *Trichoderma* sp. was the result of isolation from the roots of corn plants [2].
2.2. Methods
The experimental design was used a completely randomized design (CRD) with 3 treatments and 3 replications [3]. Treatment applied was the level of *Trichoderma sp*:

- **P0** = Banana stem inoculated with 2.5% *Trichoderma sp*.
- **P1** = Banana stem inoculated with 5% *Trichoderma sp*.
- **P2** = Banana stem inoculated with 7.5% *Trichoderma sp*.

Banana stems chopped approximately 1–2 cm and then dried in the sun. The dried banana stems sprayed with water to 55-60% humidity, then sprinkled with inoculum fungi *Trichoderma sp* according to treatment, put in a plastic bag that was given a small hole and then incubated for two weeks. After enough time the plastic is opened and samples was taken for analysis. The parameters observed were protein content [4]. Neutral Detergent Fiber (NDF) [5].

3. Result and discussion
The results showed that the physical quality banana stem inoculate by *Trichoderma sp* was presented in Table 1.

| Physical condition | P0       | P1        | P2        |
|--------------------|----------|-----------|-----------|
| Color              | Brown    | Brown     | Brown     |
| Texture            | Hard     | Rather fragile | Rather fragile |
| Fungi              | Growing evenly | Growing evenly | Growing evenly |
| Smell              | Specific | specific | specific |

After incubation during two weeks, the banana stem inoculated by *Trichoderma sp* with different level have brownish color, texture hard, specific smell and fungi growing evenly. Crude protein and neutral detergent fiber content showed in Table 2.

| Parameter | Crude Protein (%) | NDF (%) |
|-----------|-------------------|---------|
| P0        | 4.11 ± 0.26       | 59.13± 0.73 |
| P1        | 4.93 ± 1.41       | 58.17± 158 |
| P2        | 4.93 ± 1.56       | 58.56± 1.09 |

Analysis of variance showed that the level of *Trichoderma sp* not significantly effect (P >0.05) on crude protein and neutral detergent fiber (NDF). Crude protein content range from 4.11% until 4.93% and neutral detergen fiber content range from 58.74% until 59.13%. Fermentation using *Trichoderma viride* as an inoculant increased the crude protein pod cocoa from 5.63% to 9.57% [6]. *Tichoderma viride* at early phase used glucose to growing than started to degrade the fiber fraction [7]. Fermented Goroho banana stem flour with *Trichoderma viridae* dose of 0.6% and 8 days produce the best nutritional content [8].

4. Conclusion
It could be concluded that the higher levels of *Trichoderma sp* tendency increased content of crude protein and decreased of NDF.

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