Evaluation of potential and local forages nutrition as ruminant feed-in Payo Agro-Tourism Area, Solok City, West Sumatera, Indonesia

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Abstract. This study aims to evaluate local forage's potential and nutritional content in the Payo agro-tourism area of Solok, West Sumatra, Indonesia, to be used as a ruminant feed. This study used a survey method by taking a sample of the forage that grows a lot in the area and then analyzed its nutritional content. The nutritional content analyzed were dry matter, ash, crude protein, crude fiber, crude fat, calcium, and phosphorus minerals. At the same time, the TDN value and the extracted material without nitrogen were calculated based on the formula. The results showed that 12 types of forage have the potential as ruminant feed, namely *Panicum maximum*, *Tithonia diversifolia*, *Gliricidia sepium*, *Digitaria sp*, *Centrocarpa pubescens*, *Calliandra calothyrsus*, *Stachytarpheta jamaicensis*, *Bidens pilosa*, *Ipomea triloba*, *Micania Scandens*, *Asystasia gangetica*, and corn straw. This study shows that *Calliandra calothyrsus* has the highest crude protein content, and Corn straw contains the lowest crude protein. The highest and lowest TDN values were *Gliricidia sepium* and *Panicum maximum*, respectively. Through the linear programming program, these 12 plants can be formulated into 4 ration formulations with 58% TDN and 15-16% crude protein.

Keywords: Crude protein, Forage, Payo, Ruminants, Total digestible nutrients.

1. Introduction
The City Government of Solok, West Sumatera, Indonesia, seeks to exploit the potential of natural and human resources as much as possible to improve the welfare of its people. One of the efforts is through the development of agro-tourism. One of the potentials is for the development of agro-tourism in the Payo area in Tanah Garam Village, Lubuk Sikarah District [1].

A series of studies have been carried out to realize the development of agro-tourism in the Payo area. These studies include studies on livestock development. Based on this study, it has been recommended to use local feed ingredients found in Payo as animal feed. Based on these recommendations, to realize agro-tourism in stages, it is necessary to carry out studies that support it technically. In realizing livestock, it is necessary to study the feed source in-depth so that technically the farm does not experience a shortage of feed. This is done because the success of a farm is 70% influenced by the environment, including the availability of feed [2]. This research presents the identification of plants that have the potential as animal feed, the nutritional content of feed ingredients, and the preparation of an economical feed formula.
2. Materials and methods

2.1. Experimental site
Forage samples were taken around the Payo area, Solok City, West Sumatra Province. The proximate analysis was carried out in the laboratory of the feed testing and certification center, Bekasi. The sampling area is presented in figure 1.

![Forage sampling map](image)

**Figure 1.** Forage sampling map.

2.2. Materials
The equipment used in this study were digital scales, plastic samples, cutting knives, and laboratory equipment and materials for proximate analysis.

2.3. Research design
Identification of feed ingredients conducted by field survey and material sampling. Chemical analysis using the proximate analysis method [3]. Recommendations for ration formulations for local cattle are based on modified linear programming [4].

3. Results and discussion

3.1. Plants have the potential as animal feed
The identified feed ingredients in the Payo Tourism Area are presented in Table 1. The feed ingredients are *Panicum maximum*, *calliandra calothyrsus*, *Stachytarpheta jamaicensis*, corn waste, *Tithonia diversifolia*, *Bidens pilosa*, *Digitaria Sp*, *Ipomea triloba*, *Micania Scandes*, *Asystasia gangetica*, *Centosema pubescen*, and *Gliricidia sepium*. 
Based on the availability and nutritional content of feed ingredients, several alternative feed formulas can be prepared as presented in Table 2. The table shows four alternative feed formulas according to the availability of corn waste, namely without corn waste, 10%, 20%, and 30% waste corn. The higher the use of waste corn, the cheaper the feed price with the same nutritional content of the feed. This formula is based on the minimum protein and energy requirements for cattle, namely TDN 58% and crude protein 12% [7].
Table 2. Alternative feed formulas based on local resources to local cattle.

| No | Feed Ingredients | Ration A (%) | Ration B (%) | Ration C (%) | Ration D (%) |
|----|------------------|--------------|--------------|--------------|--------------|
| 1  | Energy Source    |              |              |              |              |
|    | Corn waste       | 0            | 10           | 20           | 30           |
|    | Panicum maximum  | 24           | 18           | 12           | 7            |
|    | Digitaria Sp     | 36           | 32           | 28           | 23           |
| 2  | Protein source   |              |              |              |              |
|    | Kaliandra        | 10           | 10           | 10           | 10           |
|    | Tithonia         | 10           | 10           | 10           | 10           |
|    | Gliricidia       | 10           | 10           | 10           | 10           |
| 3  | Etc              |              |              |              |              |
|    | Stachytarpheta jamaicensis | 1 | 1 | 1 | 1 |
|    | Biddens Spilosa  | 1            | 1            | 1            | 1            |
|    | Ipomea triloba   | 2            | 2            | 2            | 2            |
|    | Micania Scandes  | 2            | 2            | 2            | 2            |
|    | Centocema Pubescens | 2 | 2 | 2 | 2 |
|    | Asystasia gangetica | 2 | 2 | 2 | 2 |
|    | Total            | 100%         | 100%         | 100%         | 100%         |

4. Conclusion

Twelve plants have the potential to be used as a source of forage for ruminants based on the proximate analysis carried out. Calliandra calothyrsus has the highest crude protein content and Corn straw contains the lowest crude protein. The highest and lowest TDN values were Gliricidia sepium and Panicum maximum, respectively. These 12 plants can be formulated into four ration formulations with 58% TDN and 15-16% crude protein through the linear programming program.

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