# NUTRITIVE VALUE OF NATIVE GRASSES IN NUSA TENGGARA, INDONESIA

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## SUMMARY

A 3 year survey was conducted on 5 islands in West and East Nusa Tenggara provinces of Indonesia to evaluate the quantity and quality of native grasses. As in most tropical semi-arid areas, native grass production in Nusa Tenggara increased during the wet season (1.2 - 2.7 t DM/ha.3 month) and significantly decreased during the dry season (0.3 - 1.09 t DM/ha.3 month). Analysis of native grasses indicated that a crude protein deficiency occurred during the dry season (June-November) in most survey locations. In average, mineral status of forages in Lombok and Sumbawa islands in West Nusa Tenggara and Flores island in East Nusa Tenggara were much higher than in Timor and Sumba islands in East Nusa Tenggara. The most likely mineral deficiencies were Na at all sites but P and S only on Timor and Sumba islands. Future research should consider ways to improve the quantity and quality of feeds and feeding systems in the village areas, particularly for cattle which are raised on critical sites.

Keywords: semi-arid, tropic, native grasses, quantity, quality, cattle, Nusa Tenggara, Indonesia

## INTRODUCTION

Nusa Tenggara region in eastern Indonesia is 1 of the most important cattle producing areas. The total number of cattle in Nusa Tenggara is around 1 million head. Bali cattle are the predominant cattle breed in the area and account for more than 95 % of the total cattle number. The rest are Ongole breed raised as a pure breed on Sumba island. Although livestock, especially cattle, are an important source of income for farmers in the villages, the distribution of cattle amongst farmers is uneven. Most livestock owners possess only 2-3 cattle although there are a few villagers and traders who own several hundred cattle (Momuat and Bamualim 1994).

As a tropical semi-arid area, with an annual rainfall of less than 1500 mm, cattle production in most parts of Nusa Tenggara depends mostly upon unimproved native grasses. However, the long dry season (8-9 months/year) often seriously decreases the nutritive value of native grasses to a point where grazing animals lose weight. This is because the amount of feed consumed is inadequate to meet their nutritional requirements. Records show that animals can lose as much as 25% of their wet season liveweight due to low grass intake during the dry season (Bamualim 1991).

It was estimated that grazing land in East Nusa Tenggara comprises 47.3% of the total 50000 $km^2$ land area. This communal grazing land is used extensively for animals during the wet season, but grazing is limited to within walking distance of permanent water in the dry season. Grazing potential is constrained by lack of water and in some areas also by fires that may cause deterioration of native grasses. However information on native grasses, which is the major feed base supporting cattle production in the area, is limited. Therefore, it is necessary to identify the nutritive value of native grasses in Nusa Tenggara.

## MATERIALS AND METHODS

Native grass production was measured in East Nusa Tenggara (Timor, Flores and Sumba islands) and West Nusa Tenggara (Lombok and Sumbawa islands) in conjunction with the Cattle Health and Production Survey (CHAPS) conducted by Eastern Island Veterinary Service Project-AIDAB. The survey was undertaken from June 1990 to April 1993 on 11 sites which consisted of 3 sites on Timor, 2 sites on Flores, 2 sites on Sumba, 3 sites on Sumbawa and 1 site on Lombok island. The sampling cages were located on the grazing areas used by cattle involved in the CHAPS survey. Ten 1.5 x 1.5 m pasture cages were constructed on the ground permanently, to assess the growth of native grasses. The cages were placed randomly on grazing areas used by sampling cattle. To calculate grass production per ha base, the grass samples were taken from 1 x 1 m inside the cage by cutting all plants at the ground level during the sampling activity. The botanical composition was assessed at each site by separating the grasses, legumes and weeds components. The dominant grass species were also identified. Fresh weights of the samples were recorded and the subsamples were dried at $80^{o}$ C to estimate the dry matter (DM) production. The dried samples were then ground through a 1 mm sieve and stored before analyses of nitrogen (N), phosphorus (P), sulphur (S), sodium (Na), cobalt (Co), copper (Cu), zinc (Zn) and selenium (Se).

The samples were taken quarterly at periods that coincided with seasonal differences, ie early wet season (December-January), late wet season (April-May), early dry season (June-July) and late dry season (September-October).

## RESULTS

The grass species varied widely between sites, however the dominant species found in most sites were *Digitaria sanguanalis, Heteropogon contortus, Brachiaria millianum* and *Themeda arguens.* Production of native grasses on each island at different seasons in Nusa Tenggara is shown in Table 1. There was variation in grass production between islands and sites. The lowest production was recorded at the Kananga site (3.03 t DM/ha.year), on the eastern part of Sumbawa island, and the highest was found at the Raknamo site (6.0 t DM/ha.year) on Timor island. However there was a similar tendency at all sites for grass production to be highest at the end of the wet season (1.2-2.7 t DM/ha) and lowest at the end of the dry season (0.3-1.09 t DM/ha).

**Table 1. Average native grass production (mean&D) on each island measured at different sites and different seasons in Nusa Tenggara (t DM/ha.3 month)**

| Islands | Season | | | |
|---|---|---|---|---|
| | Early wet | Late wet | Early dry | Late dry |
| Timor | 0.38±0.27 | 1.92±0.99 | 1.67±0.57 | 0.45±0.13 |
| Flores | 0.87±0.45 | 1.42±0.59 | 1.07±0.29 | 0.60±0.18 |
| Sumba | 0.93±0.49 | 1.81±0.85 | 1.24±0.23 | 0.57±0.11 |
| Sumbawa | 1.14±0.59 | 1.93±0.87 | 0.91±0.46 | 0.32±0.25 |
| Lombok | 1.04±0.42 | 2.91±0.57 | 2.00±1.22 | 0.47±0.16 |

Results from analysis of grass samples show that a crude protein deficiency occurred during the dry season (June-November) in most survey locations. The most likely mineral deficiency was Na in all sites, whereas deficiencies of P and S were concentrated on Timor and Sumba islands of East Nusa Tenggara. The concentrations of Zn, Co and Se tended to be adequate for all sites. According to the recommended dietary requirements for mature cattle (McDowell 1985), there were 6 sites to be considered as the most critical areas for grazing animals. This included all sites on Timor (Raknamo, Benlutu and Naokae sites) and on Sumba (Lewa and Waihibur sites) of East Nusa Tenggara and only one site on Sumbawa (Kananga site) of West Nusa Tenggara. The periods of protein and mineral deficiency in the most critical sites are shown in Table 2.

**Table 2. The periods of protein and mineral deficiency of native grasses in the critical sites in Nusa Tenggara**

| Sites | Deficiency period[A] | | | | | |
|---|---|---|---|---|---|---|
| | Protein (> 7%) | P (> 0.2%) | S (>0.16%) | Na (> 0.07%) | Mg (>0.15%) | Cu (>8ppm)[B] |
| **Timor island** | | | | | | |
| - Raknamo | 6 - 11 | 1 - 12 | 6 - 11 | 6 - 11 | 6 - 11 | 6 - 11 |
| - Benlutu | 6 - 11 | 1 - 12 | 6 - 11 | 6 - 11 | 6 - 9 | 6 - 11 |
| - Naukae | 6 - 11 | 1 - 12 | 6 - 11 | 6 - 11 | 6 - 11 | 6 - 11 |
| **Sumba island** | | | | | | |
| - Lewa | 6 - 11 | 6 - 11 | 1 - 12 | 6 - 11 | | |
| - Waihibur | 9 - 11 | 6 - 11 | 6 - 11 | 1 - 12 | | |
| **Sumbawa island** | | | | | | |
| - Kananga | 7 - 12 | - | 7 - 9 | 7 - 12 | | |

[A]1-12 = from January to December; 6-11 = from June to November; 7-12 = from July to December; etc.
[B]Minimal maintenance requirements (McDowell 1985).

## DISCUSSION

Native grass production in Nusa Tenggara was strongly influenced by season. The yearly average production ranged from 3 to 6 tonnes DM/ha or equal to stocking rate of l-2 head/ha/year. However, the estimated stocking

rate fluctuated according to the season. During the wet season, estimated stocking rate was 3-4 head/ha and during the dry season the stocking rate was less than 0.5 head/ha. The production of native grasses significantly dropped in the early dry season (June-July) then gradually decreased up to the end of the dry season (November).

The lower production of grass in early wet season in East Nusa Tenggara (Timor, Sumba and Flores) than in West Nusa Tenggara (Lombok and Sumbawa) was because sampling in East Nusa Tenggara was 1 month earlier than in West Nusa Tenggara (December vs. January). In these areas, the rainy season started in December and reached its peak in January and February.

The existence of a long dry season also seriously decreased the quality of native grasses. The concentrations of crude protein and essential minerals in native grasses observed in most sites were far below the level required to maintain cattle. Native grasses examined in all sites on Timor and Sumba islands were deficient in crude protein and most essential minerals. These findings indicate that, on average, the nutritive value of forages was much better in the West than in the East Nusa Tenggara (excluding Flores). This probably reflects the better soil types on the islands of Lombok, Sumbawa and Flores consisting mainly of soils of volcanic origin, whereas Timor and Sumba islands soils were of marine sedimentary origin.

A study conducted by Bakry *et al.* (1994) also indicated that there was a positive relationship between forage quantity and bodyweight change and reproductive performance in most study sites. The reproductive performance of cattle in Flores, Lombok and part of Sumbawa islands was better than those recorded in the other sites in Nusa Tenggara.

As cattle production is largely influenced by the quantity and quality of feed consumed, results from this study suggest that it is important to find ways to improve feeds and feeding systems during the dry season in Nusa Tenggara. This may be implemented through the improvement of native pastures on communal grazing areas and strategic supplementation with plants rich in protein such as tree legumes which can be grown as intercrops.

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