

## Forage Diversification of Parent Bali Cattle in Simantri Group 733 Manah Cika Guna Bhakti, Baru Village Tabanan Bali Indonesia

Ni Ketut Mardewi<sup>1</sup>, Candyrine Su Cui Len<sup>2</sup>, Nur Hardy Abu Daud<sup>2</sup>, Luh Suariani<sup>1</sup>, I Nyoman Kaca<sup>1</sup>, Yan Tonga<sup>1</sup>

<sup>1</sup> Department of Animal Husbandry, Faculty of Agriculture, Warmadewa University, Bali, Indonesia.

<sup>2</sup> Livestock Production Program, Faculty of Sustainable Agriculture, Universiti Malaysia Sabah, Malaysia

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### CORRESPONDING AUTHOR

\*E-mail: [mardewiketut8@gmail.com](mailto:mardewiketut8@gmail.com)

### A B S T R A C T

**Simantri** is agricultural integration activity in Bali, Indonesia covering food crops, horticulture businesses, animal husbandry, fisheries, plantations, and forestry crops in one area/activity location. **The Simantri Group** 733 Manah Cika Guna Bhakti Desa Baru has been formed since 2009, with available feed sources in the form of grasses that grow naturally (nature grass) and some forage plants such as gamal (*Gliricidia sepium*) and agricultural crop waste. Forage is the main feed for ruminants, which can be in the form of grasses or fodder plants such as legumes. Partners lack knowledge in the field of feed, especially learning about types of forage that are superior in quantity and quality, and are willing to increase the variety of quality forage sources available throughout the season. Partners also want to get special forage seeds and how to cultivate them. It is necessary to conduct action research for Simantri 733 Manah Cika Guna Bhakti Livestock Farmer Group in Banjar Dinas Baru, Baru Village, Marga District, Tabanan Regency, Bali, to help solve problems faced by partners by providing knowledge about superior types of forage, the introduction of technology and skills in cultivation such as land preparation, seed selection, planting, and care. This international collaboration activity was carried out well and smoothly on October 30, 2021, attended by 20 members of the **Simantri group**. The method used is the method of extension, active participation of farmers, and exploratory. Based on the evaluation results, the **Simantri group** has recognized several superior forages and has mastered the technology for the cultivation of superior types of forage. Mastery of technology reaches 80%, so it is necessary to provide further assistance to the group during the first and second cutting and preservation techniques so that the rainforest remains of good quality

## 1. INTRODUCTION

### 1.1. Research Background

The Provincial Government of Bali launched the Integrated Agricultural System (SIMANTRI) program in 2009 [1], which is the Governor of Bali's program for overcoming problems in rural areas. One of the target villages for Simantri's activities in Tabanan Regency is Baru Village, Marga District [2]. Agricultural development with the Simantri program aims to support the development of integrated farming diversification towards local potential, increase income as one of the supports for government programs to alleviate poverty, integrate food crops and livestock farming, and pioneer sustainable integrated agricultural development to increase income [3].

Simantri 733 Livestock Farmer Group "Manah Cika Guna Bhakti" Baru Village has 20 members with 20 mother Bali

cattle. The provision of forage for the Simantri group is harvested from forage that grows in rice fields, fields, gardens, forests, and roadsides where production is highly dependent on water sources and seasons [4]. In terms of quality and quantity, the provision of feed like this is not good because forage is the main feed for ruminants, the need for forage feed for a cow every day is 10% of the cow's body weight. The Faculty of Agriculture, Warmadewa University, Denpasar Bali, has collaborated with Baru Village in the field of research and community service. The results of the initial survey found several problems from the Simantri group, which required the introduction of technology and additional knowledge in the field of forage for Bali cows because 1) The group wanted to have and increase the diversity of forage types for forage Bali cattle, 2) Group members did not have the knowledge regarding the types of forage of superior types in quantity and quality, 3) The group wants to get seeds to forage superior types to be cultivated, 4) do not have skills regarding techniques for

cultivating forage types of superior forage, and 5) The group needs cultivation equipment.

Community service carried out by the Animal Husbandry Study Program, Faculty of Agriculture, Warmadewa University, Livestock Production Program, Faculty of Sustainable Agriculture, University Malaysia Sabah, with the Simantri Group 733 Manah Cika Guna Bhakti Desa Baru is expected to provide solutions to the problems faced. Lecturers and students involved in this activity will be able to apply their knowledge in helping to provide solutions to problems faced by the community, especially in providing forage for mother Bali cattle.

This community service activity aims to: 1) Increase group knowledge of the types of forage that are superior in quantity and quality, 2) Increase group knowledge about the importance of diversifying forage sources, 3) Help improve group members' skills in forage cultivation techniques superior species by conducting demonstration plots of cultivation, 4) Helping to facilitate obtaining forage seeds of superior types for cultivation, and 5) Assisting in some of the equipment needed in the process of cultivating forage fodder.

### 1.2. Literature Review

Forage fodder is all forms of animal feed ingredients derived from plants or grasses, including legumes, either uncut or cut from the land in a fresh state. Forage food groups are grasses (Gramineae), legumes, and forages from other plants such as jackfruit leaves, hibiscus leaves, and so on [5][6]. Forage plants are classified as a source of crude fiber, a source of energy, and a source of protein. The sources of fiber and energy are grass (family Graminae) and sources of protein are beans (family Leguminosae) [7]. In the ruminant feed component, forage always gets the largest portion given, which is 60-100%. Several types of forage such as Indigofera, Elephant grass, and Pakchong grass contain high nutrients, are easy to cultivate, and have high biomass [7].

Indigofera (*Indigofera* sp) is a tree legume. Indigofera is a plant that produces natural blue color, has high productivity, and has dense leaves with good nutrient content, especially high protein content [8]. The nutritional value of Indigofera leaf flour is 27.97% crude protein (which contains well-correlated amino acids in the rumen), 15.25% crude fiber, 0.22% Ca, and 0.18% P, contains xanthophyll pigments and carotenoids [8]. Indigofera is very favored by ruminants and can be propagated by seeds. The characteristics of Indigofera plants are plant heights ranging from 3 - 4.5 m, compound and odd leaves when viewed more closely resemble bushes and the seeds are in the form of pods. Harvesting plants can be done with optimum cutting at 0.75 -1.5 m from the soil surface. The cutting interval is 60-70 days depending on the density of the plant.

Elephant grass or elephant grass Dwarf (*Pennisetum purpureum* cv. Mott), is one of the varieties of elephant grass, including superior grass originating from the Philippines. This grass has fairly high production, produces many tillers, has strong roots, stems are not hard, and has many leaf segments and a young leaf structure so it is very popular with livestock [9]. The height of this grass is about 1-1.5 m, but the number of tillers is more, namely 20-30 stems/clump. This plant can grow during the dry season with low fertility soil. In the rainy season, the cutting interval is between 30 – 40 days with the number of tillers at 20 at each harvest [9] [10]. The protein content of

elephant grass ranges from 12-to 14%. Elephant grass can be planted with 2 patterns. The first is monoculture, wherein in one area only Elephant plants are planted. The second cropping pattern is to plant it on the sidelines of other plants. The reproduction of elephant grass can be done by vegetative method, namely by using branches that grow the best. This grass is first harvested at the age of 70-80 days when the stem segments reach 15 cm. Furthermore, it can be harvested 35-45 days in the rainy season or 40-50 days in the dry season with a production capacity of 350 tons/ha/year [11].

Pakchong grass is a superior type of grass that was first planted by Prof. Dr. Krailas in the Pak Chong area, Thailand. Has a long life that can reach 9 years, and can be harvested every 40-50 days. Resistant to drought and not prickly. The nutritional content of Pakchong grass is higher than Elephant grass, especially its protein content, which is 16.45%, while Elephant grass has 13% protein. Pakchong grass production capacity is 1500 tons/ha/year [12].

### 1.3. Research Objective

The action research aimed to 1) Help the Simantri 733 Manah Cika Guna Bhakti Group to know superior types of forage and their nutritional content. 2) Facilitate groups to obtain superior forage seeds for cultivation. 3) Provide knowledge and information as well as assist groups in providing superior types of forage cultivation technology. 4) Provide some equipment used in forage cultivation.

## 2. MATERIALS AND METHODS

Elephant grass (*Pennisetum purpureum* cv. Mott) and Indigofera (*Indigofera* sp) legume seedlings were obtained from BPTU-HPT Denpasar, Panyangan Village, Jembrana District, Bali. 300 cuttings of Elephant grass and Pakchong grass seeds, 25-30 cm long cuttings, and 100 polybags of Indigofera seeds with a plant height of about 50 cm. The stages of implementing community service activities are carried out by 1) Location surveys to plan the implementation of extension activities and demonstration plots. 2) Interviews and Questions and Answers regarding the problems faced by partners as well as planning activities to find solutions to the problems faced. 3) Carry out counseling and discussions online and offline. 4) Delivery of seeds and equipment. 4) Handing over some equipment such as hoes and sickles needed in the cultivation of forage fodder. 5) Implement demonstration plots for forage cultivation of animal feed.

This action research activity went well because it was supported by the participation of partners, including 1) Partners obeyed all agreements that had been made, and 2) Partners were disciplined, serious, and played an active role in carrying out all planned series of activities. The cultivation demonstration plot was carried out after the extension and was attended by 20 group members, lecturers, and students. The demonstration plot for forage planting begins with land preparation, making holes and spacing, for grass seeds to be planted at a distance of 40 cm, while Indigofera seedlings are planted at a distance of 1 m. Treatment is carried out by group members while forage growth and development are evaluated 2 to 8 weeks after planting.

### 3. RESULT AND DISCUSSION

The community service program activity with the title Diversification of Forage for Female Bali Cattle at Simantri Group 733 Manah Cika Guna Bhakti in Baru Village, Marga District, Tabanan Regency Bali has been going well and smoothly. The activity began with a site survey to obtain data on the situation and condition of the group, which was carried out twice, namely in August and September before the main activity began. The results of the field survey are presented in Figure 1. Extension activities were carried out online, while the delivery of forage seeds, delivery of equipment, and demonstration plots for forage cultivation was carried out directly (offline). The activity was carried out on Saturday 30 October 2021. The activity began with an opening ceremony and remarks from the Dean of the Faculty of Agriculture, University of Warmadewa, and the Dean of the Faculty of Sustainable Agriculture, University Malaysia Sabah, followed by providing counseling on the importance of diversification and quality of forage for ruminants, the introduction of types of forage, providing knowledge of the nutritional content of forage, and providing forage cultivation techniques. As a resource person is Dr. Candyne Su Chui Len, Prof. Associate Dr. Nur Hardy Abu Daud from Livestock Production Program, Faculty of Sustainable Agriculture, University Malaysia Sabah, and Ir. Nyoman Kaca, M.Si from Animal Husbandry Study Program, Faculty of Agriculture, Warmadewa University (Picture 2).

The counseling was conducted online for 100 minutes, guided by Ir. Yan Tonga, M.P., and was attended by 108 participants both from within and outside the country. The activity then continued with the implementation of a demonstration plot for forage cultivation directly at the location provided by the group, the land provided for the demonstration plot was approximately 2.5 acres, followed by group members, lecturers, and students of the Animal Husbandry Study Program, Faculty of Agriculture, Warmadewa University Denpasar, Bali (Figure 3). The results of observations and measurements of forage growth at the age of 2-3 weeks, Elephant grass height reached 25-30 cm, the number of leaves was 7-8 and there were no-tillers, while the height of Indigofera was about 75 cm. At the age of 8 weeks, Elephant grass has more than 25 leaves (2-3 tillers), 50 cm high and Indigofera reaches about 1m high. The growth and development of Elephant and Indigofera grasses at the age of 2-8 weeks are shown in Figures 3 and 4 below.

Outcomes achieved from this international community service activity include: appropriate technology, publication in the form of activity videos, and has been published on Warmadewa TV Channel. This activity is a collaboration between the Animal Husbandry Study Program, Faculty of Agriculture, Warmadewa University, Denpasar, Bali, Indonesia, and the Faculty of Sustainable Agriculture, University Malaysia Sabah. The implementation of this activity involved all lecturers and several students of the Animal Husbandry Study Program, Faculty of Agriculture, Warmadewa University, and two lecturers from Universiti Malaysia Sabah.



Figure 1. Forage provided by partners to mother Bali cattle



Figure 2. Implementation of the International Webinar between Warmadewa University and the Faculty of Sustainable Agriculture, University Malaysia Sabah, and the Symbolic Submission of Green Seeds to the Simantri Group

Partners' contributions to the implementation, partners are very enthusiastic about participating in webinars and implementing demonstration plots. All partners (100%) actively participate in webinars and demonstration plots, and partners expect continuous assistance for the progress of the Simantri 733 Manah Cika Guna Bhakti group

Inhibiting and supporting factors in the implementation of community service, the current condition of the Covid-19 Pandemic is an inhibiting factor in the implementation of this International Community Service activity. As a result, it is necessary to adjust the schedule of activities with partners and activities are limited. Another inhibiting factor is that the webinar is held in a location with limited signal strength, so the IT team must bring the equipment needed during the webinar to the location for the smooth running of the event.

The benefits obtained from this community service activity are that the group (partners) gain knowledge and technology in providing more diverse forage feeds, increasing the quantity and quality of forage for mother Bali cattle, and getting assistance with superior forage seeds and skills in cultivating them. Of the 20 group members, 16 (80%) already understood the types and nutritional content of superior forage species, and 20 people (100%) mastered the theory and technology of cultivating superior forage types. Another benefit is that partners actively participate and enthusiastically participate in the implementation of activities from the time of counseling to the implementation of demonstration plot activities. All group members (100%) participated in demonstration plot activities and the group expected continuous assistance in forage cultivation.



Figure 3. Demonstration Activities, Growth of Elephant and Indigofera Grass at Age 2 – 8 Weeks

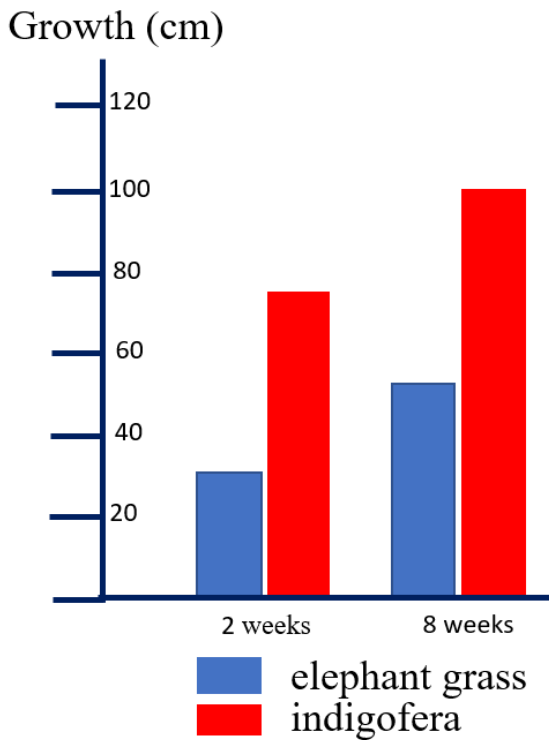


Figure 4. Growth of Elephant and Indigofera Grass at Age 2 - 8 Weeks

The supporting factor in this activity is the enthusiasm and great desire of the group to participate in all scheduled events. Partners still want to participate in continued service programs and assist in the development of Simantri 733.

The solution to overcome the obstacles faced in the implementation of Community Service is good and intensive communication between group leaders and village officials and is assisted by many alumni from Baru Village. Extension activities and demonstration plots for the cultivation of superior types of forage plants can take place smoothly on Saturday, October 30, 2021, which is attended by 20 group members. The activity was carried out following the Covid-19 prevention health protocol.

Furthermore, the Community Service team will continue to assist in the development and preservation of forage technology in rearing Bali cattle so that Simantri Manah Cika Guna Bhakti produces forage that is diverse, and available continuously, quantity and quality remain good throughout the season and produces good brood growth.

Strategic steps to realize the next plan is assisting groups in animal feed preservation technology when forage production is abundant in the rainy season. With this technology, partners are expected to have adequate and quality feed supplies, when there are traditional or religious activities, the preserved feed can be used without cutting the grass.

#### 4. CONCLUSION

The Simantri group already knows several types of superior forage and their nutritional content, has mastered the technology for cultivating superior forage types well and has almost 80% mastery of technology, so it is necessary to provide further assistance to the group at the time of the first and second cuts and preservation techniques so that greenery remains of good quality and available throughout the season.

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#### REFERENCE

- [1] Wisnuardhana, IB. 2009. Membangun Desa Secara Berkelanjutan dengan “Simantri” (Sistem Pertanian Terintegrasi). Dinas Pertanian Tanaman Pangan Provinsi Bali. Denpasar. [Distaprovincibali.com/berita/simantri.doc](http://Distaprovincibali.com/berita/simantri.doc). Diakses Pada Tanggal 5 Agustus 2021.
- [2] Peraturan Daerah Kabupaten Tabanan Nomor 1 Tahun 2014. 2014. Penetapan Pembentukan Desa Baru Kecamatan Marga Kabupaten Tabanan. <https://peraturan.bpk.go.id>. Diakses pada tanggal 5 Agustus 2021.
- [3] Wibawa, Y dan M. Yasa. 2013. Efektivitas dan Dampak Program Simantri terhadap Pendapatan dan Kesempatan Kerja Rumah Tangga Petani Di Desa Kelating Kecamatan Kerambitan Kabupaten Tabanan. *E-Jurnal EP Unud*, 2 [6] : 314-324.
- [4] Ugiansky, R. 2010. Plant guide for Florida paspalum (*Paspalum floridanum*). USDA-Natural Resources Conservation Service, Norman A. Berg National PlantMaterials Cener. Beltsville.
- [5] Nurlaha, A. Setiana, N.S. Asminaya. 2014. Identifikasi Jenis Hijauan Makanan Ternak Di Lahan Persawahan Desa Babakan Kecamatan Dramaga Kabupaten Bogor. *JITRO Vol. 1 No.1*.
- [6] Sajimin dan N.D. Purwantari.2004. Produksi hijauan beberapa jenis leguminosa pohon untuk pakan ternak. *Balai Penelitian Ternak*. Bogor.
- [7] Rukmana, R. 2005. Rumput unggul makanan ternak. Penerbit Kanisius. Yogyakarta
- [8] Hobir. 2002. Pengaruh Selang Panen terhadap Pertumbuhan dan Produksi Nilam. *J. Litri*. 8: 103-107.
- [9] Aryanto dan D. Polakitan. 2009. Uji Produksi Rumput Dwarf (*Pennisetum purpureum cv. Dwarf*). *Jurnal Ilmiah, Balai Pengkajian Teknologi Pertanian*. Jl. Kampus Pertanian Kalasey. Manado. Sulawesi.
- [10] Sirait, Juniar, Tarigan, A., dan Simanihuruk, K. 2015. Karakteristik Morfologi Rumput Gajah Kerdil (*Pennisetum purpureum cv. Mott*) Pada Jarak Tanam Berbeda Di Dua Agroekosistem Di Sumatra Utara. *Prosiding Seminar Nasional Peternakan dan Veteriner* : 643-649.
- [11] Kusdiana, D., Hadist, L., & Herawati, E. 2017. Pengaruh Jarak Tanam Terhadap Tinggi Tanaman dan Berat Segar Per Rumpun Rumput Gajah Elephant (*Pennisetum purpureum cv. Moot*). *Jurnal of Animal Husbandry Science*, 1(20), 32-37. Retrieved from <http://journal.uniga.ac.id/index.php/JIP/article/view/245/224>.