



Australian Government

Australian Centre for  
International Agricultural Research

Livestock

# Integrating herbaceous forage legumes into crop and livestock systems in East Nusa Tenggara, Indonesia

## Overview

**East Nusa Tenggara (ENT) is one of Indonesia's poorest provinces with high rates of poverty and food insecurity among rural small-holders.**

Crop nutrition, agronomic practice, rainfall yields of cereals (maize and rice) are low and seasonably variable. Annual rainfall is high but variable.

There is potential to reduce current animal and crop production constraints, without impacting on current food security, by integrating forage legumes into cereal cropping systems.

Legumes could be grown immediately after a grain crop harvest to produce large quantities of high-quality forage during the dry Season, which can then be used to improve the diets and productivity of cattle. This could also increase subsequent cereal crop yield through rotational benefits and the provision of biologically fixed nitrogen.

Increased cattle and crop productivity would improve food security and household incomes and livelihood opportunities.



## KEY FACTS

**ACIAR Project No.** LPS/2012/064

**Duration:** December 2014 to November 2019 (4 years)

**Target areas:** Flores, Sumba and West Timor, Indonesia

**Budget:** A\$1,122,782

### Project Leader

Lindsey Bell, CSIRO

### Key partners

- Queensland Department of Agriculture, Fisheries and Forestry
- Departemen Pertanian Balai Pengkajian Teknologi Pertanian-NTT

### ACIAR Research Program Manager

Dr Anna Okello

## Objective

**The project's overall aim is to further establish the benefits of integrating forage legumes in smallholder crop and livestock systems in ENT.**

**The project's specific objectives are to:**

- Develop forage legume use and management recommendations that optimise growth, quality and impacts on subsequent crops.
- Determine target timing and livestock classes to feed forage legumes, to maximise their benefits in livestock production systems.
- Quantify the impact on profitability and livelihoods and identify key drivers and limitations for integrating forage legumes across diverse farming systems in ENT.
- Understand key physiological and agronomic influences on legume seed production to identify target production environments and best-bet seed production practices in eastern Indonesia.
- Improve knowledge and skills in legume-based crop and livestock systems and systems research approaches in Indonesian research and farming communities.

## Expected scientific results

- Increased understanding of the environmental and production drivers that contribute to legume and subsequent cereal production, including soil type and fertility and climatic conditions on nitrogen fixation efficiency.
- Increased understanding of physiology and agronomy of tropical forage legumes.
- Increased understanding of growth and reproductive development of tropical forage legumes, and the influence on these factors of nitrogen fixation and other elements in species such as butterfly pea, lablab and Centro.
- Assessment of methodologies for estimating nitrogen fixation and inputs from tropical legumes.
- Development of techniques to use herbaceous forage legumes in cereal production systems in other regions.

## Expected outcomes

- Increased knowledge of the benefits of herbaceous legume integration to cereal-based crop-livestock systems.
- Improved crop yields, cattle live weight gains and birthing rates and reduced calf mortality.
- Reduced feed costs.
- Increased awareness of animal performance and quality, leading to more effective marketing by smallholder livestock producers.
- Improved livelihoods, economic status and food security for small-holder producers.
- Increased scientific capacity in agricultural research and extension agencies in the region.
- Increased expertise in livestock management, forage legume cultivation and farming systems among regional development organisations.
- Engaged producer groups testing and utilising forage legumes consistently in their production systems.
- District and provincial government departments supporting policies and promoting the use of forage legumes in their development programs.
- Recognition by local livestock traders of the impacts of forage legumes on animal performance and quality.
- Development of a commercial seed industry.