

# A REVIEW OF *CENTROSEMA PASCUORUM* (CENTURION) CVV. CAVALCADE AND BUNDEY AS A PASTURE LEGUME IN THE LEY FARMING SYSTEM STUDIES IN NORTH WEST AUSTRALIA

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## ABSTRACT

Field experiments and commercial experience with the pasture legume *Centrosema pascuorum* (centurion) in the Katherine and Douglas Daly districts of the Northern Territory over the past ten years were reviewed. Results show that cultivars of this species (Cavalcade and Bunday) have good potential for improving both soil fertility and the quality of dry season forage (as hay or grazing) for cattle in mixed farming systems in the semi-arid tropics of north west Australia.

## INTRODUCTION

*Centrosema pascuorum* cvv. Cavalcade and Bunday are annual pasture legumes developed by Clements *et al.*(1986) and released commercially in 1984 as being suitable for the semi-arid tropics of north-west Australia. Cavalcade is capable of consistently producing high herbage and seed yields ( 22% more herbage and 118% more seed than its best parent) (Stockwell *et al.*1986). Both cultivars have survived prolonged waterlogging and partial submersion on the seasonally inundated flood plains along the rivers of the Darwin-Katherine region of the Northern Territory (NT). Bunday, being later flowering, is considered to have advantages in the more deeply flooded areas (Stockwell 1985).

While extensive grazing of cattle on native pastures remains the major form of agricultural production in the Australian semi-arid tropics, recent socio-political, technological and economic changes, especially the expanding export market for live cattle in South-East Asia, have caused farmers in the higher rainfall areas of the NT (annual average 800-1600 mm, November-April) to become more interested in improved pastures and their integration with crops to take advantage of the live cattle trade. Pasture legumes such as Cavalcade and Bunday (as well as other species), are now becoming key components of mixed farming systems. Legume leys not only increase the soil nitrogen supply to a following cereal (or other non-legume) crop, thus reducing the need for nitrogenous fertiliser, but also increase the nutritional value of crop stubbles as dry season feed for cattle, as well as improving soil physical, chemical and biological properties, crop water use efficiency and nutrient conservation (McCown *et al.*1985; Thiagalingam *et al.*1991). Legume pastures can also be grazed in the dry season or cut for hay and the cubed or pelleted material used in lot feeding.

This paper reviews the results obtained with of *Centrosema pascuorum* (CenTurion) cvv.Cavalcade and Bunday in Douglas-Daly and Katherine districts over the past 10 years.

**Nitrogen contribution by Cavalcade / Bunday ley.** Centurion can provide substantial quantities (80-100 kg/ha) of nitrogen to a following grain sorghum crop. Thiagalingam *et al.*(1993) found no significant response, in either sorghum grain or stover, when nitrogen fertiliser was applied to sorghum grown after two years of ungrazed Cavalcade pasture. Other studies have shown that the availability of nitrogen from a Cavalcade ley to a subsequent cereal crop is influenced by soil type, rainfall amount and distribution. Under similar climatic conditions, the yield of sorghum following Cavalcade was higher on a heavier textured Tippera clay loam than on a lighter Blain sandy loam. This difference was attributed to higher losses of legume nitrogen due to leaching on the sandy soil

(Thiagalingam *et al.*1995).

Sorghum grown after a 2- year Cavalcade ley had a 22% higher grain protein content compared with sorghum after sorghum (Table 1). This is a significant quality advantage when the grain is being utilised in intensive cattle feeding. However, when Cavalcade is used as a hay or seed crop substantial quantities of nutrients are removed and these should be replaced before or if another crop follows the legume hay crop. Table 2 shows the nutrients removed in one tonne of Cavalcade hay and seed.

**Cavalcade and animal production.** In mixed farming systems in the semi-arid tropics, the quality of the forage available to animals in the dry season is critical. Sorghum stover, because of its low protein content, does not constitute an adequate diet during the dry season. However, under the ley system, the combination of crop residues and legume tops can provide a ration of much higher quality to grazing animals.

At Katherine, Northern Territory, *Centrosema.pascuorum* remained the dominant pasture component after 5 years of stocking at 3.3 steers / hectare, consistently producing live weight gains of 20-50kg/ha during the dry season (June to November) ( W.H.Winter, pers.comm). Steers grazing Cavalcade ley pasture at 2 head/ha at Katherine showed a liveweight gain of 800g/head/day ( from 18/4/95 - 27/6/95).

Crude protein and digestibility data of Cavalcade collected from different sites throughout the year in the Douglas-Daly /Katherine districts are presented in Table 3. Standing feed of this quality during the dry season arrests weight loss in cattle.

In a preliminary feeding trial, Cavalcade feed cubes were compared singly with lucerne feed cubes. There was no significant difference in feed intake or cattle weight gain. The digestibilities of the two feeds were 65 and 67 %, respectively.

**Commercial experience** About 6000 ha in the Douglas-Daly and Katherine districts have now been sown with Cavalcade/Bunday either as pure pastures or mixed with *Cenchrus ciliaris* (buffel grass) or *Urochloa mosambicensis* (sabi grass). Hay production now exceeds 16 000 tonnes annually.

Farmers diversifying into more intensive cattle production have remarked that their animals performed better on mixed sabi/cavalcade or buffel/cavalcade pastures than on improved grass pastures alone. The crude protein content of buffel grass in a mixed buffel/ cavalcade pasture was 10.9% compared to 4.56% in a neighbouring buffel grass only area. Similarly, in a 2-year old sabi/cavalcade mixed pasture( in which cavalcade was undersown with sorghum in 1990/91 and sabi was sown into the established cavalcade in 1993/94) sabi grass had a crude content of 10.4%. Both examples demonstrate that the quality of the grass pastures is improved by the associated legume.

It can be concluded that the pasture legume *Centrosema pascuorum* (centurion) is well adoptable to the semi-arid tropics of north-west Australia.

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**Table 1**

Effect of nitrogen fertiliser application on sorghum grain protein (%) following a two-year Cavalcade ley compared to sorghum following sorghum

N level (kg/ha)	Cavalcade/Sorghum	Sorghum/Sorghum
0	9.8	8.0
30	10.2	8.6
60	10.2	9.3
120	10.7	8.8
mean	10.2	8.7

**Table 2**

Nutrients (kg and g) removed in a tonne of Cavalcade hay and seed

Nutrient	N	P	K	Ca	Mg	S	Zn	Cu	Mn	B
Seed	50	5.2	14	2.4	2.1	1.0	32	9	22	9
Hay	18	1.2	21	15	3.3	1.7	12	6	142	7

**Table 3**

Crude Protein and Dry Matter Digestibility of Cavalcade (samples collected from various sites throughout Douglas-Daly and Katherine districts)

Month	Protein %	Digestibility %
November	6-23	Not done
December	14-24	62-79
January	13-19	56-70
February	13-19	59-79
March	8-19	59-69
April	8-15	54-68
May	8-14	53-68
June	8-14	44-59
July	6-11	42-54
August	7-11	49-54
September	6-10	29-54