# PASTURE YIELD AND ANIMAL PERFORMANCE FROM *AESCHYNOMENE AMERICANA* CULTIVARS GLENN AND LEE

H.G. Bishop, T.B. Hilder and J.J. Bushell
Department of Primary Industries, Mackay, Queensland 4740, Australia

**ABSTRACT**
An on farm demonstration site was used to promote and compare the performance of the tropical legumes Glenn American jointvetch and Lee American jointvetch (*Aeschynomene americana*). Both legumes are widely sown in tropical Australia and are being increasingly sown in South-East Asian pasture projects. Glenn and Lee both grew well and persisted in grass/legume pastures over a 5 year period. Liveweight gain of steers, at a stocking rate of 1.5/ha, slightly favoured the Glenn pasture and gains of 0.49 kg/day for a 595 day period were achieved. Soil seed reserves were much higher under the annual Glenn than for the later flowering perennial Lee. Current recommendations are to sow equal portions of Glenn and Lee in legume/grass pasture mixture.

**KEYWORDS**
Glenn jointvetch, Lee jointvetch, *Aeschynomene americana*, liveweight gain, dry matter production, soil seed reserves.

## INTRODUCTION

*Aeschynomene americana* cultivar Glenn, an annual, was released in 1984 (Oram, 1990) and cultivar Lee, a perennial, was released in 1990 (Bishop et al., 1995). Based on seed production figures Glenn and Lee American jointvetch are now the most used tropical legumes in northern Australia, outside of the Stylosanthes cultivars (Bishop and Hilder, 1993).

In tropical Australia Glenn and Lee are sown along the Queensland coast in areas receiving 1000 mm to 1600 mm average annual rainfall (AAR). Use in the "Top End" of Northern Territory and in particular situations such as the Ord irrigation area of Western Australia is increasing. Glenn and Lee are also being evaluated and sown in many South East Asian and Pacific Island pasture development projects (Stür et al., 1995). Separate areas of Glenn based legume/grass mixed pasture and Lee based legume/grass mixed pasture were sown as a Producer Demonstration in January 1992 to promote the use and value of the recently released Lee cultivar. Cattle weights were recorded to compare animal performance from Glenn, which is an annual, with that of Lee which is perennial.

## MATERIALS AND METHODS

The unreplicated demonstration site was on "Tedlands" (21°36'S, 149°18'E, Altitude 15 m), 60 km south of Mackay and in a 1400 mm average annual rainfall zone. Eighty percent of the AAR is received in the five summer months, December to April. The soil had a sandy loam A horizon overlying clay with 4 ppm phosphorus (bicarbonate extract) in the surface. Superphosphate (9% P, 11% S, 20% Ca) was applied at sowing (275 kg/ha) with 100 kg/ha triphosphate (21% P, 1% S, 15% Ca) applied 3 months and 12 months after planting. Glenn and Lee were sown into separate 10 ha paddocks each with a pasture mixture of Stylosanthes scabra cv Seca (1 kg $ha^{-1}$), *Chloris gayana* cv Callide (0.6 kg $ha^{-1}$) and *Brachiaria humidicola* cv Tully (1 kg $ha^{-1}$). Glenn and Lee were each sown at 3 kg $ha^{-1}$. Sowing took place on 22 January 1992 and grazing commenced on 21 August 1992. Each 10 ha paddock was stocked at 1.5 Adult Equivalents (400 kg LW $ha^{-1}$), starting with weaner steers at around 200 kg LW. The number of steers was reduced as their bodyweight increased but due to an irregular weighing schedule stocking rate actually varied from 1.3 to 2.0 AE $ha^{-1}$ during the project. Pasture yield and botanical composition were estimated towards the end of the growing season each year using the BOTANAL visual estimation procedure (Tothill et al., 1992). Population of legumes and frequency of grasses were also recorded during this activity. Cattle were weighed four to five times per year with each draft remaining on site for up to 2 years.

## RESULTS AND DISCUSSION

Rainfall over the five year period of the project was variable and below average but sufficient to produce good pasture establishment and growth. Pasture dry matter yield on offer at the end of each growing season, together with legume population and grass frequency, are shown in table 1. Both Glenn and Lee maintained good plant populations and dry matter production. Seca stylo persisted, but had lower populations and dry matter production than Glenn and Lee in this moist environment, growing with competitive companion grasses. Glenn is a heavy seeder and flowers 4-6 weeks earlier than Lee (Oram, 1990; Bishop et al., 1995). Sampling for soil seed reserves in March 1995 found 5128 seeds $m^{-2}$ for Glenn and 256 $m^{-2}$ for Lee in the surface 10 cm of soil. This translates to 150 kg seed $ha^{-1}$ for Glenn and 6 kg seed/ha for Lee, indicating much more Glenn seed is returning to the soil. However a plant count in January 1994 showed that seedling recruitment was occurring for Lee (56 seedlings $m^{-2}$ and 41 $m^{-2}$ for Glenn). The drop in Lee plant numbers recorded after the 1995 summer (Table 1) was also visually obvious when many large woody (original) Lee plants died during the spring and early summer of 1994. The change in grass frequency over the five summers (Table 1) documents the reasons for the now accepted practice of sowing Callide rhodes grass (a quick establishing and very palatable species) with Tully grass (a very slow establishing but subsequently a dense sward forming grass very resistant to grazing). Tully was starting to suppress legume yields by year 5 and will probably greatly reduce regeneration of the annual Glenn in the 1996/97 summer. Steer growth rates have been good with the Glenn pasture giving slightly better weight gains throughout the project. Caution is required in interpreting a two paddock demonstration with cattle only weighed 4 or 5 times per year. Table 2 presents starting and finishing weights for three different drafts of steers, with drafts 2 and 3 grazing the pastures concurrently. At the time of release it was expected the perennial Lee, with green leaf available for longer, would improve steer weight gains during autumn, winter and spring. The annual Glenn dies in winter and regenerates the following summer. There were short periods during autumn/spring when Lee steers gained more than the Glenn steers, but Glenn animals maintained slightly better annual weight gains throughout the project. Although supporting data was not collected, the annual Glenn may show better recycling of the nitrogen in the pasture system whereas the perennial Lee may tie up some of its nitrogen in the living perennial plants.

At the stocking rates used, both pastures have been very productive relative to expectations from other commercial pastures on the "Tedlands" property. Based on the results of this demonstration project general pasture recommendations are now to mix equivalent portions of Glenn and Lee jointvetch in the pasture seed mixture.

## ACKNOWLEDGMENTS

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**Table 1**

Pasture yield on offer at end of growing season (kg ha$^{-1}$), legume population (plants m$^{-2}$) and grass frequency (%). Population and frequency data are shown in ( ).

| Lee Paddock | June '92 | May '93 | May '94 | Aug '95 | May '96 |
|---|---|---|---|---|---|
| Lee | (8) | 2252 | 5108 (35) | 198 (8) | 765 (13) |
| Seca | (2) | 118 | 56 (3) | 44 (9) | 62 (3) |
| Callide | (96) | 811 (85) | 778 (84) | 775 (81) | 193 (14) |
| Tully | (17) | 48 (14) | 1088 (40) | 1587 (87) | 4977 (91) |
| Total | | 3229 | 7030 | 2604 | 5997 |
| Glen Paddock | | | | | |
| Glenn | (8) | 1248 | 6191 (44) | 44 (3) | 339 (15) |
| Seca | (2) | 405 | 76 (4) | 4 (2) | 63 (2) |
| Callide | (90) | 1245 (95) | 1870 (92) | 725 (70) | 183 (14) |
| Tully | (11) | 94 (15) | 150 (52) | 2289 (84) | 6406 (94) |
| Total | | 2992 | 9638 | 3062 | 6991 |

**Table 2**

LW Gain of Steers over the duration of the demonstration. Stocking rate in Adult Equivalents varied over period of grazing from 1 to 2 ha$^{-1}$ with an average around 1.5 AE ha$^{-1}$

| | Start | Finish | Cumulative LW Gain * | kg/day |
|---|---|---|---|---|
| Draft 1 | 21/08/92 (30 steers) | 19/07/94 (14 steers) | (697 days) | |
| Glenn | 208 | 547 | 331 | 0.47 |
| Lee | 206 | 527 | 305 | 0.44 |
| Draft 2 | 19/07/94 (10 steers) | 19/06/96 (7 steers) | (701 days) | |
| Glenn | 225 | 528 | 295 | 0.42 |
| Lee | 218 | 506 | 271 | 0.39 |
| Draft 3 | 2/11/94 (20 steers) | 19/06/96 (6 steers) | (595 days) | |
| Glenn | 198 | 526 | 292 | 0.49 |
| Lee | 198 | 483 | 267 | 0.45 |

* Cumulative LWG was calculated by adding LWG at each weighing event. Some animals were removed after each weighing to maintain stocking rate as the animals liveweight increased. Draft 3 animals grazed with draft 2 animals as from 2/11/94).