



## Legumes key to profitable and sustainable north-west NSW cattle business

*A producer snapshot by Bob Freebairn*

Maximising legume growth has played a major role in driving productivity and profitability on Sam and Megan Clifton, and son Darcy's, property "Penalva", Purlewaugh (40 km east of Coonabarabran towards Tambar Springs).

The main enterprise on their 1080 ha property is running around 350 Angus and Angus X Wagyu cows (mated to Wagyu bulls), aiming to turn off steers and sale heifers of about 420 kg/head each year, depending on seasonal conditions. That is a stocking rate of around 10 DSE/ha (dry sheep equivalent). While the Clifton's regard this as conservative, it is amongst the districts best. Unimproved similar country only runs 2.5 DSE/ha, and a fattening business like theirs would not be possible on unimproved country. In addition, because of their improved pastures, the property is better able to cope with seasonal variability and has a more stable feed base.

Sam and Megan Clifton are past winners of the prestigious Brownhill cup, awarded annually in recognition of leadership, sustainable long-term land management and high productivity. Key aspects of their win were related to a high performing beef cattle enterprise and sound land management, especially retention of sufficient ground cover, regardless of seasons, for maintaining soil quality.

They were early adopters of tropical grass pastures, principally Premier digit and Bambatsi panic, plus Consol lovegrass on very light country. They have successfully combined these with winter legumes, for their ability to improve soil nitrogen and feed quality. This has also required correction of soil deficiencies that are so vital for legume growth.



*Sam Clifton, early September 2023, checking tropical grasses plus lucerne and winter annual legumes at a stage where little rain had fallen for five months. These long-term pastures have survived previous droughts and remain strong and productive.*

### **Soils, climate, topography and other background information**

The Clifton's purchased the main portion of their property 39 years ago in 1984, with an adjoining property added 20 years ago. "Penalva" is undulating to hilly, located in the more elevated part of the district with altitude ranging from around 550 to 720 m above sea level. Average annual rainfall is around 700 mm with a moderate summer dominance.





*Angus x Wagyu cows with calves to Wagyu bulls on “Penalva”, grazing improved native grass pasture in September 2023 (a very dry season).*

Soil type is important on any property for choosing pasture species. Around 50% of “Penalva” is high quality black basalt soil, which is typically moderate to high in phosphorus but low in sulphur. A further 40% is high quality red clay to loam, also largely basalt derived. It is also generally low in sulphur, but commonly only moderate in phosphorus. The remaining 10% is broadly defined as sandstone derived, which is low in phosphorus and sulphur, as well as highly acidic.



*A large crowd inspecting a tropical grass pasture during a field day on “Penalva”, following the Clifton’s winning of the prestigious Brownhill cup.*

### **“Penalva” pasture improvement program**

Since the Clifton’s ownership, all crops and pastures have been sown via direct drill (disc and tyne drill plus press wheels) and zero tillage. This has been an important part of eliminating soil erosion, improving soil quality and improving productivity.

Approximately 50% of “Penalva” is established to tropical grass pastures, with Premier Digit the main species on all soil types and with Bambatsi panic on

the heavier soils. Some of these pastures are now close to 40 years old and remain strong and dense. Bambatsi has not persisted as well as Premier digit over this time, even on the heavy black clay soils, however Premier digit has filled in the gaps as the Bambatsi panic thinned. These grasses have proven far more productive than native grasses, supporting Tamworth DPI research indicating several times more productivity. They also respond to rain far faster than native grasses, especially after a long dry period, and their carryover feed value also tends to be greater.



*Tropical grasses making a start in early September 2023 after a long, dry autumn and winter. Tropical grasses grow in the “Penalva” environment from late August to the end of May. Winter legumes help fill the winter feed gap and provide nitrogen for the perennial grasses.*

Around 45% of the property is based on improved native grass pastures, some of it being rocky and some yet to be converted to tropical grasses. Rocky areas are not suited to cropping and are impossible to sow to tropical grasses. Tropical grasses have been phased into the property development program, with area of new sowings related to annual requirements for winter forage. Improved native grass pastures are not considered as high in stocking rate capability as tropical grass pastures, but are far more productive than unimproved native pastures.

Around 5% of the property is currently sown to dual-purpose winter crops, mainly oats. This area has been slowly declining as winter legumes in native and tropical grass pastures have contributed more to winter feed supply. Also, other means of supplying winter feed, such as hay reserves, have increased over time. More fencing and a more reliable water system has also contributed to improved use of dry carryover feed from summer growth.

Previous to their ownership, much of the farm had been long cropped via cultivation, in the era mainly prior to glyphosate. The heavier country was



infested with weeds such as mint weed, once regarded as a serious pest. Soil erosion had also been a serious issue.

### Lucerne a special case

The Clifton's have experienced great success by including Lucerne in their tropical grass pastures. In more recent years, Lucerne seed is included with the tropical grass seed mix when establishing them via a spring tyne drill seeding. In established tropical grass stands, Lucerne seed has been direct drilled via disc seeder into the existing stand of grasses, in autumn with annual legumes. This generally follows heavy grazing and as tropical grass growth slows going into winter. Success has generally been excellent.

Lucerne is proving to be persistent in combination with tropical grasses for several years now, and is expected to continue to persist with sensible grazing management. In some paddocks, Lucerne has increased in density by allowing existing plants to seed and taking care with grazing to allow self-sown plants to establish.

Years ago, Lucerne was grown successfully on its own, but bloat was always a risk with Lucerne dominant stands. Even more of a problem was lack of ground cover over protracted dry periods when Lucerne loses most of its leaf and ground is bare between plants. Risk of wind and storm rain erosion was an issue, as well as slow post drought recovery because of poor rainfall capture. Bloat has not been an issue for the Clifton's where Lucerne is part of a tropical grass pasture mixture.



*Lucerne in early September 2023 proving to be a good companion to tropical grasses, either sown with tropical grasses or direct drilled into them at a later stage.*

### Adding annual legumes

A number of introduced annual legume species, plus widespread naturalised legumes such as Hare's-foot clover, Burr medic and Cluster clover, are not only critical for improving winter feed, but as Sam Clifton emphasises to also build soil nitrogen for the grass component. Research indicates that legumes are able to add about 20 kg/ha of nitrogen per t/ha legume dry matter. Sam Clifton notes that in some years, like 2020 to 2022, legume dry matter production has been as high as 5 t/ha.

Annual legumes added to the various native and tropical grass pastures include Sub clover (mainly the early maturing Dalkeith variety), Biserrula (Casbah), Rose clover (Hykon), Arrowleaf clover (Zulu), on heavy country medic (Cavalier spinless medic), and on lighter country Serradella (King and Elgara).



*Rose clover and Biserrula emerged during the dry 2023 winter, after disc seeding into tropical grass pastures.*

Sam Clifton also emphasises that for long term persistence, which they are achieving with their introduced legumes, hard seeded varieties that are relatively early in maturity have been important. Hard seeded varieties are important for persistence because seed set is often not possible in drought years. Carryover seed for germination in following years is therefore required. Early maturity adds to the ability of plants to set seed in dry spring years. These legumes have mainly been added to arable pastures via their disc seeder, incorporating seed at a shallow depth during early autumn ahead of an autumn/winter break.

Sub clover tends to suit all but the very acidic soils on the property. Rose clover is also almost universally suited to their farm, along with Arrowleaf



clover, although it tends to only be productive in the better seasons. *Biserrula* is proving productive and persistent over the red loams and lighter soil areas. It offers further bloat tolerance compared to most legumes, is high in quality like all the legumes, is deep rooted so persists for longer going into dry conditions than many other legumes, and is believed to be responsible for lower methane emissions in cattle. Medics mainly suit the higher pH, basalt derived soils, especially the heavy black clays.



*Biserrula after very dry conditions in early September of 2023; a winter legume regarded as low bloat risk, deep rooted, and long-term persistent on a wide range of soil types, proving to be a good companion for tropical grass.*

### Tropical legumes

*Desmanthus* has been trialled on “Penalva” over the past few years but has not established as a significant contributor to the feedbase.

### Soil fertility and fertilisers

From date of purchase, Sam and Megan Clifton have addressed soil fertility issues on “Penalva”. NSW DPI district research, supported by soil testing, has revealed almost universal sulphur deficiency across all soil types on the property. Phosphorus levels varied from high on some of the basalt county to commonly moderate on the loams and very low on the lighter soils. Because of poor legume growth prior to their purchase, nitrogen levels, and therefore feed quality, was also generally low. Much of the arable areas of the farm had historically been cropped via continuous cultivation, with consequent soil quality problems as well as soil erosion.

Depending on soil tests and seasonal conditions, single superphosphate (8.6% phosphorus and 11%

sulphur) at around 120 kg/ha has been used extensively to address phosphorus and sulphur deficiency in native and tropical grass pastures. SF45 (5.6% phosphorus and 40% sulphur), or similar products, at around 120 kg/ha have been used to address mainly sulphur deficiency on the higher phosphorus soils. Frequency of application is much less than areas treated with superphosphate as there is nearly four times more sulphur in SF45.

Native grasses and tropical grasses have responded dramatically to correction of soil sulphur and phosphorus deficiencies and high nitrogen levels via legumes. Legume growth, especially for winter and spring feed, has also positively responded to sulphur and phosphorus soil deficiency correction.

### Pasture establishment techniques

Sam and Megan Clifton were early pioneers of reliably and successfully establishing tropical grasses such as *Bambatsi* panic and *Premier* digit. Their strategy is to precede sowing with three years of winter crop, that includes clean summer fallows. This eliminates weeds, and weed seed banks, that would compete adversely with establishing tropical grasses and lucerne. Pasture seed is direct drilled using a tyne seeder into the last winter crop stubble, around October/November. Their direct drill tyne seeder includes press wheels to help firm soil around the seeds. Seed is sown shallow at 0-10 mm depth.

High seed quality is an essential part of tropical grass establishment, Sam Clifton stresses. It is important when purchasing seed to ensure that germination tests are recent and germination rates are high.



*Lucerne with tropical grasses in early September 2023 after 5 months of dry conditions on “Penalva”.*

## Grazing management

Retention of groundcover is an important aspect of management that the Clifton's are adamant about.

Having around 50 paddocks, including many constructed in their period of ownership, allows for flexible rotational grazing, which is important for long term persistence of perennial species. Perennials are periodically allowed to head, and even seed set, all contributing to strong root reserves to help with persistence through droughts.

In addition to extra fencing, the Clifton's upgraded their water supplies several years ago to improve reliability and supply level. These include a property reticulation water system, a backup water supply, as well as additional dam storage. Part of grazing management is aiming for cows to be in good order (4.5 score) going into winter. This ensures they come through winter in good condition, calves thrive from birth, and cows conceive readily on time.

## Fodder crops

Winter fodder crops are part of the preparation for sowing tropical grasses, as well as for supplying reliable winter feed. However, Sam Clifton is exploring alternatives to winter fodder cropping as the established tropical grass pastures now occupy most of the property and are proving everlasting. More fodder reserves and direct drilling winter feed into tropical grasses in autumn are options being explored and trialled. Currently, winter fodder crops are sown in late summer to early autumn, to maximise probability of reliable winter feed.

## Soil quality

With the introduction of tropical species, Lucerne and annual legumes, and the correction of soil deficiencies, the soils on the property have improved in quality. Groundcover is always maintained above 90% which means that soil erosion, previously a major issue, has largely been eliminated.

## Hay production from tropical grasses

Conserved feed of tropical pastures in times of high production is a routine part of the Clifton's management. Hay production is a big part of their business and tropical grass hay from their property regularly tests above that of cereal hay for protein and digestible energy.



*Prolific and high quality tropical grass on "Penalva" following a summer rain event.*

## Drought management

Early weaning is an important part of drought management on "Penalva". For example, they will wean at 100 kg/head, or even lighter, and carefully manage young calves fed in confinement with high protein (20%). Creep feeders from birth are part of calf education and their ability to cope with early weaning. Drought management is also helped by increased supplies of conserved hay and silage, especially from their tropical grasses. When reducing cow numbers into a severe drought, non-pregnant cows are the first priority for sale. Assessing pasture feed availability is important for being able to forward plan orderly destocking if required.

## Concluding comment

Sam and Megan Clifton have been leading farmers and livestock managers for almost 40 years. Integrating appropriate winter legumes for a given climate and soil type with well-established and managed tropical grasses and native grasses, and addressing soil fertility deficiencies, are all key aspects of their success. And especially noteworthy for their success is their Angus x Wagyu business, regarded highly throughout the region.

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