Weathering the summer feed gap

Sand, deep sand, is what Lancelin farmer and *Evergreen Farming Group* vice president, Bob Wilson runs his 1000 head beef cattle enterprise on. *Focus on Salt* magazine last caught up with Bob during 2006, a drought year, when he spoke of his success in sustaining summer feed and, as result, a hefty herd. Two years later *Future Farm* magazine can reveal that Bob's system of tagasaste and subtropical perennial grasses, continues to provide sustenance throughout summer.

"You should see our perennials after the out-of-season spring rain during November — they're growing like crazy," Bob said.

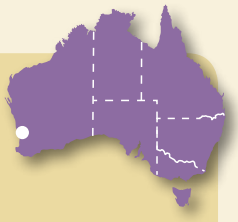
"Admittedly they may have been limited this year because they were not fertilised as a result of low cattle prices and skyrocketing fertiliser costs. But I've tried to be as creative as I can.

I started with the perennial fodder shrub tagasaste as a means to drought-proofing our property about 22 years ago.

Although we receive, supposably, 650 mm of rain annually our soil doesn't have the water holding capacity of other soils and so we need more rain, more often.

I have found it difficult to rely on annuals, such as subclover, alone. For example, this year we had a false break during April, which triggered germination, but with no more rain for three weeks we lost most of our annuals. It is the same problem with an early finish. Without our perennials in the system — this would have been a recipe for disaster.

farm info.



Case study: Bob Wilson

Location: Lancelin, Western Australia

Property size: 2000 ha

Mean annual rainfall: 650 mm

Soils: Sand

Enterprises: Beef cattle

Photo: Tim Wiley

Bob Wilson manages the long Lancelin summer and the resulting feed gap with perennial pastures and fodder shrub, tagasaste. INSET: Bob regularly shares the results of his farming systems with other farmers and researchers.

We have about 1000 hectares of tagasaste and since 2003 have planted about 240 hectares of subtropical perennial grasses, mainly panic, Rhodes and Signal grass.

We still have some annuals in with the perennials, although these are mostly Brome grass, capeweed and of course blue lupins.

During spring all stock are run on the tagasaste, to prevent it from flowering.

This year, during mid-August the blue lupins really took off and I am hoping they will provide the perennials with nitrogen rather than me having to provide it out of a bag.

So far it looks like my wish might be granted — if the perennials is anything to go on — they look pretty healthy.

I really think understanding soil biology is the future frontier for farming. Something, that we don't completely understand yet, happens in the soil underneath perennials.

For example, during a recent drought Tim Wiley, (DAFWA) dug up two panic plants; the soil between the plants was bone dry but underneath the plants the soil was wet.

Underneath our perennials and among the tagasaste I believe we are building up mycorrhiza fungi. This could explain the moisture and also why we are getting a build-up of organic carbon under the perennials. The fungi also produce enzymes that convert immobile carbon to humus, which lasts for much longer in the soil.

Soil tests on our farm comparing annual pastures with perennial grasses show that the perennials are sequestering carbon in the soil at a rate of 7 tonnes of carbon dioxide equivalents per year. Tagasaste is sequestering carbon at a similar rate, but with about half the increase being in the soil and half in the woody stems and roots. At this rate of storage our perennials are actually a net sink of green house gasses.

key points

- Perennial grasses such as Panic, Rhodes grass and Signal grass as well as fodder shrubs such as tagasaste can provide valuable summer feed for livestock
- A combination of perennial grasses, fodder shrubs, legumes and annual grasses has seen a Lancelin-based, beef farmer maintain heavy stock numbers while improving his soil biology.

Stocking up

We currently run 750 breeders and 300 yearling cattle and increased our carrying numbers during spring 2006 when we bought 500 breeders. We also took part in a *Grain & Graze* trial that saw us continue to carry big numbers throughout the drought — equivalent to those we would typically carry.

We ran the stock on a mixture of tagasaste and perennials and the whole experience emphasised the benefits of such a system. Some out-of-season summer rain fired up the perennials and we sustained the numbers.

I was a bit nervous carrying such high numbers. I knew the tagasaste would stand up because of it's deep root system. But perennials have to be grazed and rested and I didn't know how long they need to rest.

With tagasaste and perennials we aim to graze up to 9DSE/ha. During last summer we carried more than 10DSE/ha on the tagasaste. Obviously, without the summer rain this high rate may not have been possible.

Nutritional value

I am still pleased with the nutritional value of the perennials although I think the younger stock might need supplements — probably partly as a result of not fertilising.

The system relies on rotational grazing. We lock up the perennial grass paddocks around August ready for the young bulls during summer. Last year the young stock did not gain as much weight as I anticipated. Mature plants tend to be lower quality due to an increase in the fibre in the leaf. But, this is not to say the plants are not thriving and with recent late rains this year there is strong growth coming through.

I intend to consult an animal nutritionist to see, if supplements are needed and will get a plant leaf analysis carried out.

Fertiliser options

While I didn't fertilise this year, I'm not sure this is a sustainable practice. I'm thinking of trialling a non-traditional approach using biological fertilisers — compost tea, it's not biodynamics but biological.

At a recent conference in NSW I met and visited a Victorian farmer who is using it on crops. The cost comparison was about one third less using a biological approach, and yields last season were comparable to a more conventional neighbour.

It is quite labour intensive. This farmer applies the compost tea spray once during sowing and twice during the growing season — so that isn't a lot different to traditional chemical applications. He has volcanic soils, which after years of phosphorus application have locked up large amounts of fertiliser. He believes compost tea increases soil microbes that release the phosphorus.

Perennials — a growing trend

There is a lot of local interest in sub-tropical perennials. But due to a number of poor seasons and poor returns from stock, there probably hasn't been significant uptake. Up until this season, there is probably more than 100,000 ha of tagasaste and 30,000 ha of subtropical grasses planted in WA. About 7000-10,000 ha are subtropicals in the region this year. The most popular combination was Rhodes grass, Panic and Signal grass.

Panic performed slightly better than Rhodes grass under drought conditions around Geraldton, which could have been due to grazing management. I suggest sowing a mix that includes Rhodes grass. DAFWA trials suggest the more intensive the rotational grazing, the more vigorous the green panic. Having more paddocks results in higher stocking pressure when each paddock is grazed — but a longer rest between grazings. High stocking pressures stop cattle selectively grazing the panic plants. At low stocking pressures the panic gets hammered till it is weakened and outcompeted by the less vigorous Rhodes grass."

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science behind the story

By Tim Wiley, DAFWA

- **Bob Wilson's farm has deep sands with very low water and nutrient holding capacity. These sands typically hold about 40 mm of water per metre of soil. So a subclover plant with its roots down 750 mm only has access to a maximum of 30 mm of water and would require rain about every 10 days during spring to survive. Consequently, annual crops and pastures do poorly on these coarse sands.**

Tagasaste and perennial pastures have much deeper roots and therefore have access to more stored soil water. Tagasaste is known to root down to at least 10 metres. This depth of sand could store about 400 mm of rain, or about two thirds of the average annual rainfall at Lancelin. While the rainfall at Lancelin is strongly winter dominant, tagasaste can grow through summer by accessing winter rainfall that has drained to great depth.

The subtropical grasses are also deep rooted but not to the extent of tagasaste. The maximum rooting depth of these perennial grasses is not known but live roots have been found at 4.5 m on deep sands. The subtropical grasses have a different photosynthesis pathway (C4) to other plants (C3). This C4 pathway allows them to use water more efficiently than other plants. The down side of the C4 plants is that they need more sunlight energy and higher temperatures than C3 plants for growth. So the combination of deep roots and a lower water requirement allows these C4 perennial grasses to persist through very dry summers and droughts.

While these species and other subtropicals grasses have been grown north of Perth for more than a decade without any serious livestock problems, there is a low risk of toxicity. To manage this risk, its encouraged to plant a mixture of species to reduce intake of any one kind by livestock. Temperate (C3) perennial grasses such as phalaris, fescue and cocksfoot have not persisted north of Perth.

Underneath his perennials and among the tagasaste Bob is building up mycorrhiza fungi. These are fungi that live in symbiosis with their host plant. The host plant allows these fungi to grow right inside the cells in the roots. The mycorrhiza then grows out into the soil and can exploit much more of the soil than the plants roots can. The plant provides the fungi with sugars for energy. In exchange, the fungi provide nutrients and water to the plant. These fungi produce enzymes that release phosphorus chemically in the soil, which is not normally available to plants. Trials by DAFWA in the region are showing more available phosphorus under the perennial pastures than under annual pastures.

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