Satellites, Stocking Rates and Sustainability

Background

To demonstrate how Pastures from Space™ technologies can be used to increase grazier's skills in sustainably increasing stocking rates. To achieve this, the wool productivity of a group of wethers (PFS wethers) run at a stocking rate at least 25% higher than the district average using the Pastures from Space™ technologies to budget Feed on Offer (FOO) was compared to a same age, same sex group run at district average stocking rates with "normal" paddock management (Control wethers).

What was done

A 15.9 ha paddock (SW1) was selected for the demonstration on the property of J & J Symons.

The pasture in the paddock is typical of the western half of Kangaroo Island and consists of annual species dominated by subterranean clover and capeweed, with a minor contribution from the annual grasses winter grass, silver grass, barley grass and soft brome grass. The paddock had been managed as a single paddock for 20 years prior to the demonstration. To allow some rotational grazing in the demonstration, the paddock was sub-divided into 3 sections (2 of 6 ha and one of 4ha) and water points were provided in all sub-paddocks.

Weekly pasture growth rates (PGR) were determined for the paddock using the Pastures from Space™ satellite imaging technology. During April 2007, single superphosphate was applied to all paddocks at the rate of 14 kgs Phosphorus per hectare. On 18th May 2007, the 200 PFS wethers and the 524 Control wethers were drafted in to their management groups, weighed and drenched with a parasiticide. The PFS wethers were run at 12.6 wethers per hectare. The 524 Control wethers were allocated two paddocks, comprising 62.7 hectares in total to rotate between. The stocking rate for the Control wethers was 8.4 wethers per hectare. This meant that the PFS wethers were stocked 50% higher than the Control group.

The PFS wethers were rotated between the three paddocks within SW1. The rotation was determined using the weekly Pasture Growth rate (PGR) data using the PastureWatch™ software and the Feed Budget (Agvet Services Pty Ltd) computer model. A minimum FOO of 700 kgs DM per hectare was set for the PFS mob and the paddock shifts were determined on this basis. This resulted in paddock grazing periods of between 1 and 7 days.

The Control mob received supplementary feeding until 31st May and then were rotated between their two paddocks as per the normal management practice of the farm. At all stages following the segregation of the sheep, the Control mob had a higher level of FOO than did the PFS mob.

By the start of September 2007, pasture biomass and PGR in SW1 allowed the sheep to be set stocked. Also at the beginning of September 2007, approximately 25% of the total area on SW1 was fenced off in an attempt to accumulate biomass for hay conservation to be fed back to the wethers later in the trial period. Unfortunately, the failure of consistent late September and October rainfall did not result in the expected pasture growth and the decision was made not to cut for hay and the wethers were given access to this area from the end of October onwards. From then until

shearing in mid January 2008, the PFS wethers remained set stocked over the whole of SW1.

Both mobs were assessed for Worm Egg Count (WEC) and with the maintenance of very low WEC such that drenching was not required for either mob.

Both groups of wethers were shorn on 14th January 2008 with 12 months wool growth. At shearing, a random sample of 50 PFS wethers and 50 Control wethers were measured for GFW and had mid-side wool samples collected for fibre assessment.

Results

The bodyweight of the PFS wethers increased steadily until shearing on the 14th January 2008. At shearing, 5.9 kgs greasy wool was removed which started the fall in average live weight recorded. Subsequent to that, average live weight continued to decline at a rapid rate due to a combination of declining FOO and decreasing digestibility in the residual dry pasture. On the 11th February 2008, the PFS wethers averaged 59kgs and the pasture cover on the PFS paddock was estimated at 400 kgs DM/ha. The decision was made to remove the PFS wethers from SW1 and in to maintenance feeding elsewhere on the farm (could have been moved into a drought lot) to conserve sheep bodyweight and preserve the topsoil in SW1. The Control wethers were in a similar position 4 weeks later.

Whilst the Control wethers were not weighed after the initial segregation in May 2007, they were being run at a much lower stocking rate on much higher FOO levels. Visually the Control wethers looked bigger and to be in better condition score earlier in the season, but as bodyweight was not being used for comparison, similar weighings were not carried out.

Feed budgeting using weekly PGR estimates provided by PastureWatch™ and the Feed Budget simulation program allowed the PFS wethers to be managed through Winter on between 700 and 1000 kgs DM per hectare consisting of high quality annual pasture species. Due to the lower stocking rate in the Control mob, Winter FOO was considerably higher. Whilst this Feed Budgeting took a little extra time in the office, moves for the PFS mob could be planned 2-3 weeks in advance.

As was to be expected, the PFS wethers cut less greasy wool per head. However, the wool produced had a higher yield, was of a slightly higher average fibre diameter with a lower standard deviation of fibre diameter. The differences in per hectare clean wool production and value in the PFS mob greatly exceeded that of the Control mob run at the lighter stocking rate, with a 44% increase in Clean Fleece Weight per hectare (CFW – 53.37 kgs cf 36.94 kgs) and a 42% increase in wool income per hectare ($/ha - $551.41 cf $388.09).

On the cost side of the ledger, the higher stocking rate in SW1 led to an increase in direct sheep costs per hectare. The principle cost centres are shearing and crutching, supplementary feeding and animal health (drenches, vaccine, WEC monitoring costs). The other direct cost that is of importance in this demonstration is supplementary feed. The higher stocking rate in the PFS paddock meant that the potential for a longer period of supplementary feeding in summer / autumn and hence a higher supplementary feed cost existed. The cost of the extra 4 weeks of supplementary feeding was $69.03 per hectare for Barley or $63.11 for Hay. Obviously, the length

and quality of the growing season will have a profound effect on the supplementary feeding differential required, as will the cost of supplementary feed in the time period under consideration.

The per hectare net benefit of the PFS mob over the Control mob is given by the formula:

Wool income PFS per hectare – Wool income Control per hectare – Extra supplementary feed cost PFS per hectare + ((Control Shearing / crutching costs per hectare + Control animal health costs per hectare) – (PFS Shearing / crutching costs per hectare + PFS animal health costs per hectare)).
In this scenario, the PFS mob generated $78.33/ha over the control mob

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A full report of this study is available from the PIRSA Office in Dauncey Street, Kingscote

Take home message:

- The application of Pastures from Space™ technologies allowed wethers to be carried at a stocking rate 50% above the district average
- There were no significant differences in animal health or parasite burden between the two groups
- The per head wool production was reduced by approximately 5% in the PFS mob, however the per hectare performance was 42% above the Control mob for CFW and 44% above the Control mob for wool income per hectare. This outstanding result demonstrates the ability of merino sheep to grow wool at close to maximum rates on 800 – 1000 kgs DM per hectare of good quality feed
- Forward feed budgeting using the Feed Budget program was able to predict when it would be necessary to initiate supplementary feeding in the PFS wethers and when it would be necessary to remove sheep from the paddock all together. This allowed forward planning to maintain adequate ground cover and hence preserve top soil in the more heavily grazed paddock
- The net benefit in the PFS wether group was $73.83 per hectare after allowing for the higher direct costs per hectare associated with the higher stocking rate and the extra supplementary feed required in the PFS wethers. Due to the extraordinarily high prices for supplementary feed in early 2008, the extra supplementary feed cost $63.11 per hectare. This obviously had a large influence on the magnitude of the net benefit, with a benefit of $97.00 per hectare being achieved using long term average supplementary feed prices