GRAZING AND FEEDLOTTING SHEEP ON SALINE LAND

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Introduction

Greg and Camille Tippet farm in the low rainfall (310mm) central agricultural region, south of Shackleton. Approximately 10% of their 2300ha farm "Ynoo" is affected by salinity and it is likely that more of the land will degrade. It only took 25 years for their most fertile and productive cropping land to become saline.

In an attempt to lower the watertable over the area by planting the salt tolerant perennials, *Atriplex* species, the Tippets have successfully revegetated much of their saline land, reduced erosion and have beautified the previously dominant bare salt areas. Secondary to this, and perhaps more importantly to the Tippets, it is being utilised productively as a series of feedlots across the farm which has increased the carrying capacity of livestock, along with increasing the areas available for cropping.

Background

The majority of the Tippet property has been cleared for sixty years, with approximately 100ha of remnant vegetation remaining. From the 1970s they traditionally sharecropped 900ha mostly to wheat, leaving over 1200ha to pasture. The Tippets farming enterprise was heavily based around merino sheep, running a breeding flock of approximately 2000 ewes. At this time, there was more available pasture and water, and the cropping rotations were one in every three to four years.

Approximately 50% of the farm is situated in a broad valley floor, and by the late 1970s the first signs of salinity were beginning to appear in this region of their farm. In their first attempt at salinity control, they attempted to channel surface water into an existing creek in the middle of the farm. This was achieved by implementing a Wisalt bank system in the early 1980s. However, by the 1990s it was apparent that the banks were not alleviating the problem and salinity was increasing. In their next attempt at major landcare works they planted 20 000 trees in the mid-1990s, here targeting recharge management and discharge sites.

In 1992 Greg purchased the cropping plant from the share-farmer Con Vanderberg. In 1996, his parents Edith and Lloyd retired to Perth and Greg and wife Camille took over management. In taking on the farm, they had six major aims for improving productivity and profit on their property:

- Improved tillage practices;
- Reduced weed burdens;
- Increased cropping areas;
- Increased livestock numbers;
- Improved pastures; and
- Improved natural resource management.

Recent history

Living amongst the salinity, and seeing it everyday, the Tippets wanted to be proactive in their attempts at salinity management.

In August 1996, Greg undertook their first major saltbush planting, block sowing 80ha under full contract using a Kim Seed contour seeder. This first stand included River saltbush (*Atriplex amnicola*), Wavy-leaf saltbush (*A. undulata*), Old Man saltbush (*A. nummularia*), Quailbrush (*A. lentiformis*) and Small-leaf bluebush (*Maireana brevifolia*). This was sown at 1.2kg/ha, with Tall Wheat Grass (*Thinopyrum elongatum*) and *Acacia saligna* seed being trickled behind. They were anxious to cover the bare salt affected land, and they knew in this saline valley floor environment, saltbush would grow quicker and more successfully than trees.

In March the following year, the Tippets hand-harvested their seed, collecting approximately 500kg. Following this they grazed the 80ha stand. Due to inexperience, the grazing was light with low numbers and they found that managing the sheep in this size area was not easy. Sheep could easily hide amongst bushes and the only access was on motorbike, and then not easily. With only 2m spacings between rows, and no breaks for access points, it was difficult to manoeuvre through the areas.

In August 1997, Greg undertook the second phase of their saltbush planting. At an approximate cost of $150/ha in the first year, which included preparation, seed and contract costs, he was able to reduce the costs to $80/ha by using their own seed. Greg also realised the importance of smaller grazing areas and having good access within the paddocks. Greg embarked on a circular tramlining alley system which allowed vehicle access by leaving the corners out and enough machinery width for future work. From 1997 to 1999 the saltbush planting averaged 20ha per year.

Since 1997, Greg has continued with a sowing rate of 1.2kg/ha (Table 1) and has been using his own seed, with 50% of the mix made up of River saltbush, 40% Old Man saltbush, and 10% Wavy-leaf saltbush. He has not continued seeding Quailbrush or Small-leaf bluebush. Quailbrush is a very good windbreak and shelter for stock and allows an excellent niche for biodiversity, however the plants becomes woody and are not ideal for grazing, also due to their larger size. He has not continued with Small-leaf bluebush as this species naturally regenerates in the fenced off areas. The saline affected soil varies from duplex soils to blue clays with River saltbush being the most successful to establish and persist, probably due to its high salt tolerance and moderate drought tolerance, and good waterlogging tolerance when mature (Barrett-Lennard and Malcolm, 1995).

Table 1 Saltbush seeding regime

• Spraytop area year before seeding
• Knockdown of weeds prior to seeding
• August-September, 1.2kg/ha saltbush + vermiculite direct seeded using niche seeder
• Spray for insects when necessary
• Circular tramlining with corners out and boomspray width between

From the earlier 1990s, the Tippets were running their lowest stocking rates due to low wool and sheep prices, with approximately 1300 breeding ewes. In 1999 they bought in stock and effectively doubled their stocking rates. Throughout this time, Greg was continually improving the rest of his farm by having better weed control in his crops and better pasture management. By the late 1990s, the Tippets were cropping 1300ha leaving 650ha of improved pasture. In addition, by this time he had approximately 150ha of saltbush available for grazing.

In 1999 and 2000 Greg realised the need for good grazing management on available pasture areas. With more of the farm in crop and only 650ha of pasture, Greg utilised the saltbush stands for crash grazing in a rotational system with the pasture paddocks. He was able to place most flocks on the saltbush, which spent at least three to four weeks grazing. However this was not rigid, and was dependent on rainfall and pasture growth in the improved pasture paddocks or the understorey of the saltbush paddocks.

Present

By improving the management of their pastures, including the 150ha of saltland pastures, the Tippets have increased the carrying capacity of livestock on their farm from 3.4 Dry Sheep Equivalents (DSE) in the early 1980s when they concentrated mostly on their sheep enterprise, to 6.2 DSE today (Table 2). In the same period they have reduced the area of pasture from 1300ha to 800ha (650ha improved and 150ha saltland).

Table 2 Carrying capacity of sheep on available pasture

Early 1980s

800ha crop 1300ha pasture

	DSE rating	Total DSEs
2000 pregnant ewes, last 6 weeks	@ 1.6	3200
650 weaners (gaining 200g/day)	@ 1.8	1170
50 rams	@ 1.2	60
Total Stocking		4430 **Therefore 3.4 DSE/available pasture ha**

Early 1990s

900ha crop 1200ha pasture

	DSE rating	Total DSEs
1300 pregnant ewes, last 6 weeks	@ 1.6	2080
600 weaners (gaining 200g/day)	@ 1.8	1080
50 rams	@ 1.2	60
Total Stocking		3220 **Therefore 2.7 DSE/available pasture ha**

Today

1300ha crop 650ha pasture
150ha saltland pasture

	DSE rating	Total DSEs
2000 pregnant ewes, last 6 weeks	@ 1.6	3200
950 weaners (gaining 200g/day)	@ 1.8	1710
50 rams	@ 1.2	60
Total Stocking		4970 **Therefore 6.2 DSE/available pasture ha**

In 2001 Greg realised that to better manage the saltbush stands and rotational grazing regime of the livestock, the saltbush paddocks would be a more effective source of feed and use of area as a series of feedlots. All of the existing paddocks of saltbush, except the original 80ha, were divided into 5 to 15ha areas, each with a water source. Ideally, livestock enter the feedlot when there is fresh understorey grasses and broadleaf pastures, such as clover and capeweed. The sheep are supplementary fed every two to three days, averaging 350g/head/day of lupins, and a bale of straw is unrolled over an area, usually bare, in the feedlot that the sheep will graze. Greg has observed that the sheep will eat the lupins and green understorey pastures first, approximately 50% of the straw and eventually eating the saltbush. Greg feels that only 10% of the diet should be saltbush, and it is only when the remaining feed is unavailable that a significant amount of saltbush is consumed by the sheep.

The major benefit of the feedlots and this regime is that they can supply feed during the autumn and end of spring feed gaps. It has also been noticed that the time in the feedlots is a good transition between the pasture paddocks and crop stubble. While in the feedlots, after being taken off the pasture, the sheep are being trained to eat grain from the ground and have access to a full dietary complement. Another benefit is that when all of the saltbush is grazed the area becomes a pure feedlot that appears to have less of an environmental impact. Wind and water erosion is a common concern in feedlots, however in this scenario the bushes act as wind barriers, even as grazed sticks they stabilise the soil. Water run on and run off is less of an impact due to a more stable soil. Greg also does not place sheep in a wet feedlot, again minimising disturbance and sedimentary run off, and reducing health concerns such as foot abscess risks. What is also important for Greg is that while the sheep are in the feedlots, there is less improved pasture area

being used by them for grazing. Therefore, there can be better pasture establishment, production or recovery by keeping the sheep off these areas. It also means that there is less compaction by livestock occurring within the larger cropping paddocks which will promote better soil structure and crop production.

What has been noticed over the past seven years is that the areas that were completely bare and in places had white salt crystals on the surface, have successfully had saltbush growing for between one and seven years. In the older stands, between the rows of saltbush, there are now annual legume species such as subterranean clover, grasses and broadleaf weeds. These species indicate that the salt levels in the upper soil profile are reducing. This is mostly an affect of the winter rainfall leaching the surface salt into the subsoil (Barrett-Lennard and Malcolm, 1995) but may also be an affect of general salt level reduction due to the saltbush lowering the watertable. Another observation is that in the areas where the straw has been rolled out and browsed by the sheep, grasses have grown through. The species are likely to be volunteer wheat or barley from seed in the straw or are other grasses. It is apparent that the straw has acted as mulch, which has reduced evaporation at the soil surface therefore decreasing the movement of subsoil water and salt to the soil surface by capillary action (Barrett-Lennard and Malcolm, 1995).

Economics

In discussing the Tippets decision to reclaim their saline land, economic analysis can be made on the scenarios of not addressing the problem and letting more land go saline, to investing in the problem and determining if it was a good investment for the farming enterprise.

The saline land on the Tippets property has been reclaimed to a higher and better use through its improved and increased land utility. Therefore, we need to compare like with like, that is, equivalent grazing land. The nominal value for the saline land today is similar to before reclamation, that is, $10/ha (Valuer Generals Office). The current land value in the shire of Bruce Rock is $520/ha (VGO), valuing 100% as productive cropping land. Quality grazing land is equivalent to about 40% of this (VGO assess salt spotted and patchy barley grass land at 25%). Consequently, fully reclaimed grazing land is assessed at a higher rate and the Tippets grazing saltland is worth approximately $210/ha (40% of $520).

To consider if it is economic to reclaim saline land it is prudent to consider a before and after approach (Table 3). Losses of earnings, inflation, interest and charges have been excluded, and this approach has been considered on a nominal basis. The comparison will be made on the 150ha of saltland pasture that Greg has established.

Table 3

Before Reclamation	**After Reclamation**	
150ha x $10/ha = $1500	150ha x $210/ha = $31 500	**Asset (Land) Value**
Nil	150ha x $115/ha = $17 250	**Reclaiming Costs**
Nil	150ha x 6DSE x $60/ha = $54 000	**Sheep Income**
Nil	150ha x 6DSE x $7/DSE = $6300	**Sheep Costs**
Nil	**Sheep Income – Sheep Costs = $47 700**	**GM Profit**

Reclaiming Costs $115 = averaging $150/ha first year and $80/ha years since, for costs
Sheep Income 6DSE = current stocking rates for available pasture area on Tippets property
$60 = current average lamb prices (Landline, 2002)
Sheep Costs $7/DSE = current estimate of costs for one DSE (Burt, E. 2002, *pers comms*)

Simple Return on Income (ROI) per year

Gross Margin Profit÷Cost of Reclaiming

= $47 700÷$17 250

= 2.8%

Return on Assets (ROA) per year

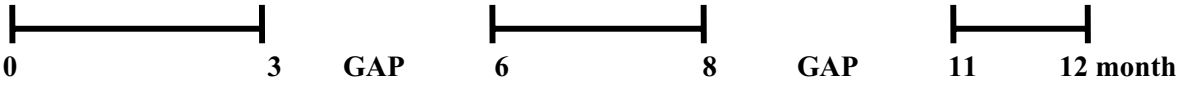
Gross Margin Profit÷Asset Value

= $47 700÷$31 500

= 1.5%

In considering the ROI and ROA, we must go back to considering the options of "doing nothing" or "investing in the problem". The money invested in "doing nothing" is equivalent to money sitting in the bank over 10 years (same timeframe) and would only earn 5.72% (The West Australian, 2002). By investing in the problem and repairing the land it has generated a ROI of 2.8% x 10 years (28%) and a ROA of 1.5% x 10 years (15%). As a financial comparison, this is a sound investment that increases the farms overall performance and the attractiveness of the investment.

We can also compare the value of this 150ha of grazing saltland for the four to six months in the program where there are feed gaps.



To rectify the feed gaps some options include:

1. Feedlot with supplementary diet @ 80c/head/week on saltland (calculated on current feed prices of a composite mix)
2. Agist @ 30c/head/week (for 6 months) = $7.80/head (grazing worth per DSE, have not included transport costs or health risks to sheep) (Burt, E. 2002, *pers comms*)
3. Buy and Sell (lamb prices currently approximately $60/head)
4. Buy extra land and forgo saltland ($520/ha versus $210/ha)

Table 4 Feed gap options

Options	Pros	Cons	Remarks
Feedlot	Higher stocking rate Use of saline areas	Cost of supplementary feeding and infrastructure	
Agist	Surplus pasture elsewhere	Health, management, freight	Supply dependent
Buy and Sell livestock	Sell at a good price Buy in cheap	Buy too expensive Sell too cheap	Market dependent
Buy more land	Sell at a good price Buy in cheap	Buy too expensive Sell too cheap Does not rectify degradation (defer problem)	Availability Market dependent

The options can be considered as short-term market and supply driven responses and it is imperative for each farming enterprise to evaluate the pros and cons and analyse each scenario economically for their situation. In the case at hand, Greg wanted to rectify the problem and improve the value of the asset and he has found that this asset readily fits their farming system, economically and in management.

The future

In the past six years Greg and Camille have embarked on reclaiming their saline land. With 150ha successfully established to saltland pastures, they have managed to turn an area of land of no production into land with a high production potential. The Tippets now plan to improve another

300ha. At this point the land is at low to moderate production with limited cropping options, such as barley, and the grazing of annual pastures. However saline seeps are present and widening and the area could turn to land of no production if attention isn't given. They see the task of revegetating with saltland pastures and creating more feedlots will take them another six years. They plan to continue with the tramline alley system and in areas of 5 to 10 ha. They feel that for their farming system, they may reach equilibrium in managing the saline regions and the areas of high cropping and pasture production in the next ten years.

In attempting to stabilise the land and reduce erosion and groundwater, their saltland pastures have added value aesthetically, and more importantly, productively. However, it must be emphasised that the Tippets entire farming system has undergone a marked management shift in the last six years. With better access to information and making improvements in their cropping, pasture and sheep management, their saltland pastures readily fit into the existing farming system. The saltland paddocks and feedlots have presented an opportunity to increase feed supply, particularly through the feed gap periods, allowing better management of available land for better crop and pasture production.

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