FUTURE OF AERIAL AGRICULTURE FOR GRASSLANDS:

AERIAL AGRICULTURE IN ACTION - ON FARM RESULTS IN THE CONTROL OF SERRATED TUSSOCK

Roy Reynolds

Grazier
'Hanworth', BANNABY via TARALGA, NSW 2580

Abstract: *Without aerial agriculture non- arable country infested with serrated tussock (Nasella trichotoma) would continue to decline in productivity until it became totally worthless for grazing. Aerial agriculture has enabled us to convert heavily infested country into moderately productive country. The structure of the soil is improving and, with the inclusion of perennial grasses, the country is far less prone to erosion. A total of 1468 ha were treated by aerial techniques between 1988- 90 inclusive. In conclusion we are leaving the land far more productive and more ecologically stable than before treatment. We believe that the use of aerial agriculture has enabled us to achieve a sustainable system.*

My property, 'Hanworth', is located on the eastern fall of the Southern tablelands 70 km north east of Goulburn in a 700 mm rainfall area. When I took over management for the new owner Mr Grant Jagelman in 1988 the 5,000 ha property consisted of three blocks: 730 ha of improved country with light to moderate serrated tussock (*Nassella trichotoma*) infestation; 100 ha recently improved country sown to clovers and cocksfoot; and the balance 4,170 ha heavily infested with serrated tussock.

The granite based soils are typical of the area being deficient in phosphate and molybdenum but of good structure and well drained. The original timber was predominately white and yellow stringybark, yellow box, hickory and wattle. Much of this was ringbarked in the 1930s, even on the rocky outcrops.

The soil is littered with loose rock on the surface and has rocks mixed in with the topsoil as well as numerous rocky outcrops.

The topography varied from hilly to steep, interspersed with gullies and divided by four major waterways: the Wollondilly river, and the Guineacor, Bannaby and Hanworth creeks.

This gives a variation in height above sea level of 270 m to 840 m and obvious changes in the vegetation and growing times from the high country, which is the bulk of our useable country, to the low country on the river frontage.

PASTURE IMPROVEMENT FOR THE CONTROL OF SERRATED TUSSOCK

The steep terrain and rocky nature of the land dictates the use of aerial agriculture. Small areas can be sod seeded but the rocks cause many breakdowns and slows the job enabling only very limited areas to be treated. The inaccessible areas left are a haven for tussock which reinfests newly sown areas. So, we decided upon a total aerial approach to the improvement program.

Having come from a conventional farming area in the central west, I enlisted the advice of local Department of Agriculture and Fisheries agronomists Peter Simpson and John Dymock, a local rural adviser John Sendall and of course the "Tussock Guru" Dr Malcolm Campbell.

There are Agfacts and many articles written about the details of serrated tussock control and pasture establishment so I won't bore you with the finer points. Basically, it is like any other crop/pasture establishment program, *ie.*, prepare a seed bed free of competition. This is done by spraying serrated tussock in spring-early summer with Frenock(R) at 2 L/ha, then, following an autumn break, knocking competition that invades as the tussock dies with 2 L/ha of Roundup(R). This is followed with a seeding of clovers and perennial grasses at 10 kg/ha and superphosphate at 250 kg/ha. We spread seed and fertilizer

separately to get even distribution as I have yet to see a job of spreading mixed seed and fertilizer that gives acceptable results. It only costs $5/ha to do the seeding separately out of a total cost of $284/ha for the full program. Mostly it is necessary to control red- legged earth mites with Lemat(R) in late winter and/or early spring.

The management of the newly sown country is critical to the long term viability of the pasture. This is more so with aerially sown pastures than with conventionally sown as establishment and seedling growth is slower. It is essential to not graze the country for at least one year, and to apply another 250 kg/ha of single superphosphate within the first year. This enables the introduced plants to set seed and out-compete any emerging serrated tussock seedlings. Graze the pasture quite heavily and quickly during the late autumn, one year after sowing to remove dead plant litter and thus allow the sub-clover to regenerate. It is necessary to spell the pasture during the second and third spring-summer periods to allow the pasture to regenerate, set seed and hopefully smother tussock seedlings. If possible, 250 kg/ha superphosphate should be applied annually until phosphate levels are up to at least 35 ppm (AFL test). Then maintenance applications must be made to maintain the 35 ppm. However for most of us wool prices will have to increase dramatically to enable us to continue this program.

I am convinced that serrated tussock will never be eliminated from this region using existing practices - perhaps if it can be attacked biologically it may be eliminated. However, it would seem that it can be reduced to an extent where it is not a problem to production.

This stage has been reached on some of our country already, but the cost of spot spraying certainly isn't negligible. There is much of our land that cannot be spot sprayed due to the terrain so we intend to allow it to reinfest to the stage where it becomes a problem. Then the entire area will be resprayed with a reduced rate of Frenock(R) which will selectively kill the serrated tussock and not damage the improved species if done at the right time in early to mid spring. This will probably be done between 5 to 10 years after the initial spraying/seeding program.

IMPROVEMENTS

After my first year of aerial agriculture I was very disappointed with the inconsistent results of applying Roundup(R) largely due to it dissipating before it hit the target. This is accentuated by the steep terrain, large trees, powerlines and wind tunnels caused by steep gullies. We seem to have overcome the problem through a change to helicopters and the addition of Anti Drift(R) (a foam adjuvant) which helps hold the particles of Roundup(R) together.

The second disappointing aspect was the effect of the differing ballistics of the seeds, where the heavy clover would fall quickly and evenly, the light grasses were getting blown up to hundreds of metres away, leading to many areas getting no seeds. The use of coated seeds has improved distribution as the coating adds weight to the seeds and they fall more evenly and quickly to the ground.

The third disappointing aspect was, and still is, the accuracy of the pilots in seeding and supering. This is a problem in steep country as it is not possible to use markers due to the topography and the unusual shape of the paddock boundaries. We need to develop some system of paddock point reference, such as a small flare dropped on each run by the pilot to give him a bearing for his next run; at present commercial flares are too expensive. I also feel the super and seeding equipment on the aircraft should be upgraded to give more even distribution. If a flow meter was coupled to the air speed indicator it would overcome guesswork. We have moved to granulated fertilizer to gain more even spread, but still use the more soluble single superphosphate for the establishment year as the phosphate is more readily available to new plants.

The change to helicopters for the spraying has other benefits. For example, dripping nozzles on fixed winged aircraft applying Roundup(R) bare the airstrip and causes erosion and costly maintenance. We have used choppers to do patch spraying of thistles and tussock very effectively, as their manouverability allows sheep camps and small problem spots around trees to be tackled easily. We use an old petrol tanker to take the water and chemicals to the job which reduces down time through lack of materials. It is important to be in the paddock being treated instead of on the airstrip to assess the weather and the quality of the job being done.

I must stress that within the aerial agricultural industry there are good and bad operators of planes and choppers, and no matter how good the equipment, if the operator is not a top-notch pilot, the job will be unsatisfactory.

ECONOMICS

The 85% of 'Hanworth' that was heavily infested with serrated tussock in 1988 was running less than 1 DSE/ha. The improvement program shown in Table 1, cost $284/ha in the initial year, but the country is now capable of running up to 7.5 DSE/ha. To have done nothing would have seen productivity continue to diminish, yet to go out and buy country of similar carrying capacity would cost $1500-$1700 per ha and the country would still require fertilizing. So we feel the program has been worthwhile and certainly would not have been possible without the use of aerial techniques.

The ongoing maintenance and development of this country, due to the need for fertilizers and the spot and total spraying of serrated tussock, requires the use of aerial agriculture.

There are small parts of the property that can be mechanically farmed but there is a high probability of severe soil degradation. This risk is well illustrated on an adjoining block of 280 ha which was recently purchased, and is now undergoing a soil conservation program (costing $100,000) to fix up erosion caused mainly through mechanical farming and overstocking. The use of aerial agriculture will help eliminate the risk of erosion in the future. It also allows trees to be left that would have to be cleared in many areas to enable mechanical sowing. Admittedly we have killed a few small stringy bark trees with Roundup(R) but the number would be less than 20 on the 1,468 ha sprayed to date.

Table 1: Cost of pasture improvement for the control of serrated tussock

ITEM/ACTIVITY	$/ha
• Spraying	
* Spring – early Summer	
· Frenock(R) 2L/ha at $25/L	50.00
· Anti-Drift(R) 0.1L/ha at $6.25/L	0.63
· Helicopter spraying $19.15/ha	19.15
* Late Autumn	
· Roundup CT(R) 2L/ha at $14.75/L	29.50
· Anti-Drift(R) 0.16L/ha at $6.25/L	0.63
· Wetter TX(R) 0.1L/ha at $7.00/L	0.70
· Helicopter spraying $19.15/ha	19.15
• Seeding	
· Grass and legume seed (includes: phalaris; fescue; cocksfoot; perennial ryegrass; subclover; white clover)	43.69
· Fixed wing plane seeding	4.89
• Fertilizer	
· Single superphosphate 250 kg/ha at $170/t	42.50
· Fixed wing plane spreading	12.71
• Spraying	
· Red-legged earth mite control Lemat(R) 0.05L/ha	1.60
· Helicopter spraying using 12 L water/ha	8.65
• Fertilizer (Autumn following year)	
· Hi-Fert(R) superphosphate 130 kg/ha at $336/t	43.68
· Fixed wing spreading	6.17
TOTAL PROGRAM COST TO FIRST GRAZING	284.00
AREA DONE	
1988 324 ha	
1989 690 ha	
1990 454 ha	