Cell grazing – the first 10 years in Australia

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Abstract

This paper tracks the progress of Cell Grazing in Australia from 1990 when it was first taught, to 1999, from 2 perspectives. The first is a model of an industry paradigm shift. The introduction of Cell Grazing to Australia has all the hallmarks of a paradigm shift at the industry level. It is following the classic pattern outlined by Kuhn (1970) and is well progressed to the point where it will be accepted as 'normal science' within another 10 years.

The second perspective is industry oriented, where results obtained from properties throughout eastern Australia are presented. These results illustrate the impact that cell grazing is having on business profitability (2-3 times higher profit), soil improvement (double the available soil P), Rainfall use efficiency (double previous levels), biodiversity (increasing), and animal performance (variable).

Cell Grazing is described as a high level, time control grazing method and is thus different from continuous grazing, rotational resting, rotational grazing and multi-camp rotational grazing systems. Comprehensive definitions of the different systems are used to illustrate why the scientific literature has got it so wrong compared to industry results. Terminology used in the literature is also categorized to assist in this understanding.

Introduction

It was May 1989 when Dr Stan Parsons first introduced Cell Grazing and holistic management to Australia with an address to the NT Cattleman's Association at Tennant Creek. During the early nineties, Cell Grazing was thought by many to be controversial. The words 'Cell Grazing' and 'Savory' frequently evoke an emotional response from rangeland and pasture scientists. This is apparently due to "*a dense emotional fog engendered by Mr Savory's personality and approach*" (Skovlin 1987). Almost all the scientific literature in fact '*proves*' that the Cell Grazing as outlined by Savory (1988) does not work (Jones 1993).

However, when Cell Grazing is analysed in depth from the perspective of both producer and researcher, one finds a fascinating dichotomy (McCosker 1991,1994) between the results of each. I hope to shed a little light on the reasons for the differences.

To overcome the early conflict in opinion between Parsons and the establishment, I travelled through the USA, Zimbabwe, Namibia and South Africa in 1991 to look at the roots and the development of Cell Grazing. Only after seeing the outcomes time and time again in all possible environments, was I finally convinced that the principles could not be faulted. It was therefore only in 1991 that the first cells were built in Australia.

The introduction of Cell Grazing to Australia has followed the classic pattern of a paradigm shift as outlined by Kuhn (1970). Kuhn describes the 'normal science' (or paradigm) as '...research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundations for its further practice'(p10). Research is conducted within the existing paradigm. The accompanying paper by Joyce (00) gives a good description of 'normal science' in the context of a Central Queensland cattle producer. He also outlines the elements of the new paradigm.

Kuhn depicts a typical process of a paradigm shift as having several stages. These are:

1. 'Normal Science' begins to be troubled by crises. (*e.g high business failure rates, large scale land degradation, widespread soil acidification and salt buildup. See also Joyce (00)*)
2. Ad hoc modifications are made to 'normal science', while the idea of a paradigm shift is resisted. (*e.g. poisoning or clearing trees instead of growing grass under them, monitoring without management context.*)
3. A new paradigm emerges, which in the beginning can only explain some of the questions which have led to the crisis in the dominant paradigm. (*e.g Cell Grazing, other* Grazing for Profit™ *principles.*)
4. There is a small move towards the new paradigm: (*e.g. a handful of brave graziers have a go. Pioneering research is conducted by Earl and Jones 1996.*)
   - Polarization between the proponents occurs. (*e.g. threats are made.*)
   - Specialized journals and societies appear in the new paradigm. (*e.g. The Stockman & Grass Farmer Journal, the* Grazing for Profit™ *Club emerges.*)
   - Claims are made about the need for education in the new paradigm. (*e.g. courses offered by Orange Ag College and Cell Management qualifications at Emerald Ag College.*)
5. Discussion between the proponents are never quite satisfactory, as theories are incommensurable. (*e.g. The 'Will Cells Sell' workshop in 1993.*)
6. New text books are written. (*e.g. Savorys 'Holistic Resource Management' in 1988.*)
7. Popularization of the new paradigm occurs. (*e.g. articles in the popular rural press now appear monthly.*)
8. Over time, more scientists are convinced that the new paradigm has much to offer. (*e.g. A major review of*

grazing management experiments, based on the new paradigm, was conducted by Norton (1998), which not unsurprisingly, found major flaws in institutionalized understanding. Such views however are unlikely to be accepted by 'normal science'.)

9. Slowly, the 'new paradigm' becomes 'normal science'.

After 10 years in Australia, where do things now stand? In terms of a paradigm shift, cell grazing and spin offs from it, are now a long way through the process outlined by Kuhn (1970). Indications are that Cell Grazing is likely to be considered 'normal science' within another 10 years.

Before proceeding to look at some outcomes of Cell Grazing, we need to be certain that we know what Cell Grazing is.

What is Cell Grazing?

These days it is fashionable to call everything where animals are rotated, Cell Grazing. This however is not the case. Cell Grazing is based on a set of principles, the first of which is based on the work of the French agronomist, Andrè Voisin (Voisin 1959). The remaining Principles have been steadily evolving in the extensive livestock industries, over the last 30 years. Considerable progress has been made in the understanding and extension of the principles in Australia since 1994. The first Australian research on Cell Grazing was published by Earl and Jones (1996).

Nobody can claim to be Cell Grazing unless at least the first five principles are followed strictly and in priority order. Experience over the last 10 years shows that it takes several training events and 3-5 years practice at running cells, to competently manage Cell Grazing. *It is therefore not for the faint hearted or those unwilling to invest in training.*

The principles are:

1. Control rest to suit the growth rate of the plant.
2. Adjust stocking rate to match carrying capacity.
3. Plan, monitor and manage the grazing.
4. Use short graze periods to increase animal performance.
5. Maximum stock density is used for the minimum time.
6. Use diversity of plants and animals to improve ecological health.
7. Use large mob size to encourage herding.

Table 1 (updated from McCosker 1991), summarizes the five different grazing management systems, and some of the confusing array of names that are used by various authors. This nomenclature is based on paddock number per herd (which affects relative graze period and stock density) and type of rest, ie. time control or calendar based.

Why is there a difference between the perception of science and that of production?

Terminology of grazing systems and methods

A large reason for the dichotomy between scientific and industry results is due to the bewildering array of terminologies and approaches used in the literature and their general irrelevance to the practice of Cell Grazing. A review of 88 grazing experiments where a form of rotation was compared to continuous grazing revealed that only one was in fact Cell Grazing (McCosker 1993a).

One of the problems with interpretation of the literature is the use of similar terminology to describe different systems. For example, Taylor *et al* (1993a,b) in Texas, describe a High Intensity Low Frequency (HILF) grazing technique where each of 7 paddocks is grazed for 22 days and rested for 132 days. They subsequently altered the graze/rest periods to 7 and 42 days respectively and called this Short Duration Grazing (SDG). Both approaches however, are Rotational Grazing systems with a different rest period (See Table 1).

Under the HILF system they found that high successional grasses responded favourably but livestock performance was less than optimal. Under SDG with 7 paddocks, they found that livestock production was enhanced but it resulted in a decrease in the standing crop.

Both these outcomes were predictable based on the principles of Cell Grazing as outlined above i.e. a consistently adequate rest period improved range condition (Principle no 1) in the former and a shorter graze period increased animal performance (Principle no 4) in the latter. Being calender based, neither is a Time Control Grazing method. Nor would the terminology of "*High Intensity*" and "*Short Duration*" equate with the intensity or duration recommended for Cell Grazing.

Taylor *et al* (1993b) concluded that there were few advantages to be gained from "more intensive" grazing systems but recommended a combination of continuous grazing, HILF and SDG (their definitions) throughout the year. This is a good example of the classic ad hoc modification of 'normal science' while resisting the new paradigm, described by Kuhn (1970). Taylor *et al* (1993a,b) apparently accepted the disadvantages of each system, without attempting to break the nexus between the requirement of the plant for adequate rest and the need of the animal for a short graze period. This nexus can only be broken with more paddocks, which is a fundamental principle (no 4) of Cell Grazing (the rejected paradigm).

The dichotomy between the scientific literature and commercial results

Bryant *et al* (1989) have been frequently quoted (Burrows 1990; Burrows 1992a,b; Hacker 1993) as providing the reasons why Short Duration Grazing (and by implication Time Control Grazing) should not be used by Australian

A summary of grazing systems and methods.

COMMON NAMES AND/OR SUB METHODS	DEFINITION	COMMENTS
- Continuous grazing - Set stocking	Plants are continuously exposed to animals.	1. At high stocking rate, it causes widespread overgrazing of plants,is drought and erosion prone, has fluctuating animal performance due to variations in quantity and quality. 2. (b) At low stocking rate, it causes undergrazing in patches and overgrazing in the remainder. May lead to woody weed ingress and overuse of fire. Animal performance is high and relatively stable.
- Spelling - Deferred rotation - Deferred grazing - Merrill system	One or two more paddocks than there are herds or flocks. Rest may vary from weeks to years.	May defer effects of overgrazing. Leads to undergrazing and can reduceanim al performance. Common reasons for use include: burning, drought reserve, special animal needs, allowing plants to seed..
- Rotational grazing - High intensity, low frequency grazing (HILF) - Short duration grazing	3-7 paddocks per herd on fixed calendar based moves	There are many approaches using rest periods of 30-365 days. Suffers from lower animal production than continuous grazing in 43% of cases studied. Perpetuates patch grazing and consequent under and overgrazing effects.Ca n slow de.g.radation in about 50% of cases.Ca n only be used on sweet country due to the effects of a long rest period on quality..
(a) High Utilisation Grazing (HUG) - Acocks/Howell system - Short duration grazing - Non-selective grazing - Crash grazing - Mob grazing (b) High Performance Grazing (HPG) - Controlled selective grazing	(a) HUG. > 7 paddocks/herd. Each paddock is severely grazedbefore moving to the next, generally on fixed calendar based moves. (b) HPG. > 7 paddocks/herd. Each paddock is lightlygrazedfor a short period so that only the most palatable plants are grazed. Ungrazed undesirable plants eventually die out. Calendar based moves.	3. Will reverse land de.g.radation. High stock density and long grazing periods can lead to high utilisation and good animal impact. Suffers from very low animal performance. Usually uneconomic due to low Gross Margin. 4. Will reverse land de.g.radation. Designed to increase palatable species. Has a short graze period and high animal performance. Has low stocking rate and is hence more wasteful of rainfalland sunlight energy than HUG.Usually uneconomic due to reduced turnover.
(a) Production Focus - Block grazing - Strip grazing - Rational grazing (Voisin) - High density, short duration grazing (b) Holistic Focus - Savorygrazingmethod (SGM) - Cell grazing - Controlled grazing - Management Intensive Grazing (MIG) - Planned grazing - Ultra-High density grazing	> 7 paddocks/herd, but usually 20-40. Moves are based on the growth rate of the pasture and its physiological requirement for rest. It is not calendar based. Requires high stock density. • Production: Focus on maximizing plant and animal production. • Holistic: Focus on ecosystem sustainability and optimizing profit.	Recovery period (RP) is determined by plant growth rate. Paddock number and recovery period then determine graze period (GP). Varying RPprotects the plant. Short GP maintainshigh anim al performance. Combines the best features of D(a) and D(b). Makes more effective use of rainfalland sunlight energy than other approaches.

graziers. There are several problems with this proposition. Firstly Bryant *et al* (1989) base their comparisons on the Merrill system ("*3 herd, four pasture deferred rotation system*"), the *two pasture switch back system* (both Rotational Resting systems) and the HILF systems ("*one herd, seven pasture, high intensity, low frequency systems*") which is a Rotational Grazing system. All were calender based and conducted at low stock density and thus bear no relationship with Cell Grazing.

Secondly, the conclusions drawn by Bryant et al (1989) were "based on experiences of Texas Tech researchers with greater-than-recommended stocking under short duration grazing systems (see the definition of (SDG) used by Texas Tech defined by Taylor *et al* (1993a) above) compared with yearlong grazing". It is therefore apparent that Cell Grazing principle No 2 was broken in this work.

Thirdly there is some confusion in the paper by Bryant *et al (1989)* as to whether the conclusions are based on SDG, on HILF, or on both. Nevertheless, the claims made by Bryant *et al* (1989) provide a good framework to examine the dichotomy.

Claims: SDG resulted in a decline in individual animal performance.

SDG did not improve diet quality of grazing animals

Response: Most Rotational Grazing systems which have long graze periods (22days in the case of Bryant *et al* 1989) will depress animal performance. Diet quality (Taylor *et al* 1980) and consequently dry matter intake (McCosker 1993a) are depressed as the graze period is extended. Graze periods of 1 to 3 days will maximise animal performance. *Principle No 4 was not adhered to in their work.*

Claim: Doubt has been cast on the theory that SDG improves animal distribution.

Response: Animal distribution is improved by having a high stock density. Minimum recommended stock density to improve utilisation is 10 head/ha for cattle and 60 head/ha for sheep (McCosker 1991). Success in Australia has been greatest when Stock Density has exceeded 20 head of cattle/ha or 200 sheep/ha. The stock density used in the experiments summarised by Bryant *et al* (1989) averaged 0.68 AU/ha (from Taylor *et al* 1993 b) for the HILF systems. This is approximately one tenth of the minimum and one thirtieth of a good level. *Principle No 5 was therefore not adhered to in their work.*

Claim: SDG produced no positive influence on germination or establishment of seeded or native plants, but it did result in soil compaction.

Response : Succession will not be changed in a brittle ecosystem (Savory 1988, McCosker 1993a) without adequate animal impact or herd effect. Adequate animal impact is unlikely to occur at less than 5 head of cattle or 10 head of sheep/ha (McCosker 1991). The experiments quoted by Bryant *et al* (1989) did not approach these levels. *Principle Nos 5 and 7 were not adhered to in their work.*

Species which can grow for extended periods, such as perennial grasses, are successful at penetrating heavily compacted soil (Russell 1977). Root development however depends on the plant producing sufficient carbohydrate. Unhealthy plants, be they under or over-grazed, are typically shallow rooted, *e.g.* roots of black and blue Grama grasses in New Mexico penetrated to 120cm, 60cm and <30cm on properly grazed, overgrazed and badly overgrazed rangeland respectively (Russell 1973). It is therefore difficult to conceive of compaction under well managed grasslands.

Claims: SDG did not improve range condition at the same or higher stocking rates compared with continuous grazing, however data indicated that range condition might be maintained under SDG at slight increases in stocking rate (10-20%).

SDG did not increase grass or forb standing crop. Dramatically increased stocking rate was not possible.

Response: It is highly improbable that carrying capacity can be lifted in a Rotational Resting or Rotational Grazing System by more than 10-20% due to poor utilisation (a function of low density grazing), generally inadequate rest and lack of animal impact. A survey of properties using either Multi-camp Rotational grazing or Time Control grazing for 5-25 years (average 9.5 years) in the USA, RSA, Zimbabwe and Namiba, indicated an average increase in carrying capacity over that time by a factor of 2.1 (McCosker 1991). *Ignoring Principle Nos 1,2,3,4,5,6 and 7 will all contribute to this conclusion.*

In a study conducted on a 16-paddock Cell in Kansas by Darrell Emmick of the New York Soil Conservation Service (Cubbage 1992), it was shown that:

- The animal unit grazing days increased from 80 to 147 per acre (+84%)
- Forage production increased from 3172 lb/ac to 6,203 lb/ac (+96%)
- Average daily gains remained similar to a continuously grazed program
- The property owner saved US $100/cow/year on input costs

Table 2 indicates why carrying capacity has been lifted under Cell grazing. Data in Table 2 was collected on a property near Windhoek, Namibia (Argo Rust *pers comm*). This property has operated under Cell Grazing since 1970 and shows clear long term improvement. This improvement has led to a doubling of the stocking rate.

Despite the fact that the second principle of Cell Grazing is to match stocking rate to carrying capacity, reviewers such as Jones (1993) and Burrows (1992a,b) express concern that stocking rate can be doubled with Cell Grazing. Such concerns however are at considerable variance with stocking rate increases recommended by colleagues such as Partridge and Miller (1991) for north Australia where recommendations range from 7 to 40 fold increases in stocking rate on native pasture through the addition of sown legumes.

Claim: The level of economic input and management intensity required to establish and operate a SDG system is excessive, except to increase the ease or flexibility of livestock handling. The return did not justify the expense.

Response: Economics are best left to the people who have to make their living out of grazing. Australian industry results, are typified by those of Sparke (00) and Joyce (00) in the accompanying papers. Ninety-five percent of international respondents to a survey indicated that TCG or MCRG significantly increased their profitability. 80% had reduced labour inputs (McCosker 1991).

Claim: SDG resulted in an increase in animal yield per unit area grazed if stocking was increased. This would be true regardless of grazing strategy.

Response: See Principle No 2

The claims by Bryant et al. (1989) and the above responses, clearly indicate what happens when the cell grazing principles are <u>not</u> applied. The question now is "What happens when the principles are applied?

Table 2: Long term range condition trend on a property in Namibia (from McCosker, 1991)

	Maximum points	1969	1982	1988
Soil condition	20	0	17	18
Vegetation density	10	2	4	7
Vegetation composition and structure	10	3	9	9
Plant vigour rating	10	2	9	9
TOTAL	50	7	37	43

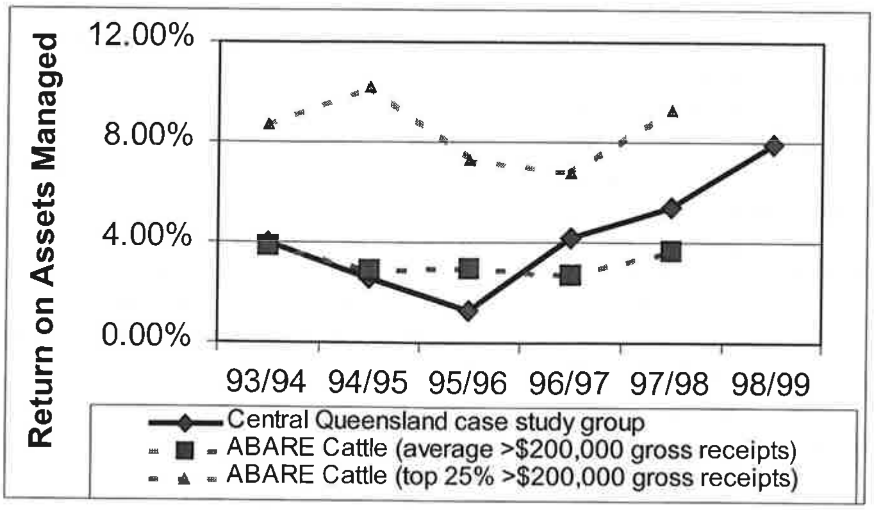


Figure 1: Comparison of ROAM between ABARE results and a case study group of Central Queensland graziers who have implemented the Rural Profit System™. ***Note - ABARE figures for 98/99 have not been included as they are not confirmed.***

What happens when the cell grazing principles are followed?

1. Profits go up

The following two graphs show what happened to a group of Tasmanian wool growers who have implemented the *Rural Profit System* ™ and who have substantial areas of their properties under cells. Figure 1 shows that their Return on Capital has been going up over the 3 year period from 94/95 to 96/97, despite lower wool prices and a declining trend in the rest of the industry.

2. Cost of production goes down

Figure 2 shows that for the above case study group, productivity per hectare has increased by 50% while cost of wool production has decreased by almost 50%.

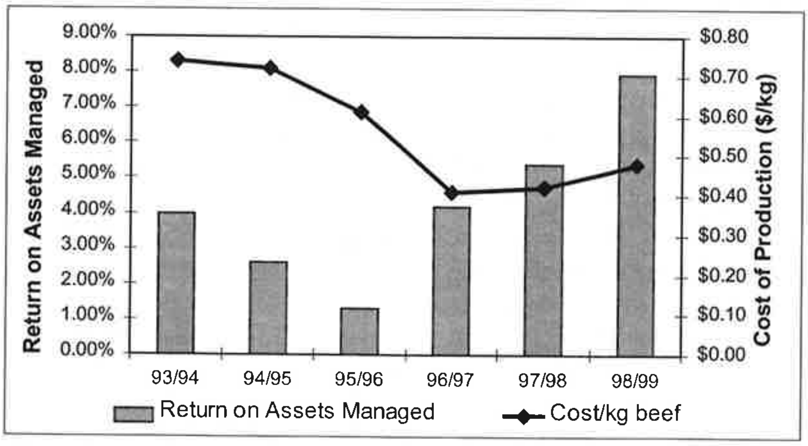


Figure 2: Trends in return on assets managed and cost of production from a case study group of Central Queensland graziers who have implemented the Rural Profit System™.

3. Inputs go down

In high input areas, cell graziers have generally ceased fertilizing altogether, ceased artificial weed control measures, substantially reduced animal health costs and ceased substitution feeding of livestock with hay, silage or grain. These are obviously inputs and costs that are not needed in an environmentally based management system. One of the best examples of this has been where a Flinders Island grazier split his property into 3 portions and ran three different production systems for five years. 1999 was an extreme drought year, but the cells still maintained a high stocking rate relative to the two continuously grazed systems, both of which had been fertilized annually, and the high input system, very heavily.

Table 3 Relative stocking rates from three production systems on "Burra Downs", Flinders Island.

Years	Continuously grazed, conventional input	Cell and low input system	Continuously grazed, high input system
1995	100%	100%	100%
1996	100%	120%	120%
1997	100%	120%	120%
1998	85%	120%	100%
1999	73%	110%	93%

Table 4 Production results from "Burra Downs", Flinders Island, during four years of drought.

	1994/95	1995/96	1996/97	1997/98
Cost of Production ($/kg greasy wool)	$4.64	$2.97	$2.79	$3.09
Wool Price	$4.65	$3.40	$3.68	$4.10
Annual Rainfall (mm) (AAR = 750mm)	550	550	470	620
DSE Carried	3044	4879	6550	7769
ROAM	-0.2%	2.1%	3.1%	3.4%

Production and economic performance from the total property are shown in Table 4.

Despite two thirds of the property being run under systems which were clearly not working, the owners, Steve and Marie Crawford, have made improvements to the business. As a result of the relative performance of the three systems during the 1999 drought, both the conventional and high input systems are to be disbanded in favor of Cell Grazing over the whole property.

The Fergusson family on their "Grindstone Bay" property on the East Coast of Tasmania have shown similar results from the introduction of Cell Grazing, as shown below in Table 5.

Table 5. Production and Economic results on "Grindstone Bay" with the introduction of Cell Grazing.

	Average Pre 93/94	1993/94	1994/95	1995/96	1996/97	1997/98
Carrying Capacity (DSE)	15,000	16,491	19198	18,212	24,246	24,775
DSE Days/100mm rain	450	350	342	270	580	641
Wool CoP ($/kg greasy)	>$6.00	$3.60	$4.28	$1.87	$1.64	$2.35
Wool Price($.kg greasy)	na	$3.62	$6.80	$5.11	$4.63	$6.67
Gross Margin per DSE	na	$11	$22	$20	$20	$24
Gross Income/Labour unit	na	$107,000	$122,672	$128,429	$163,000	$171,343
Fertilizer (Kg/ha SSP)	180	71	60	0	50	50
Annual Renovation (ha)	100	10	10	10	10	10
Overheads ($/ha)	$84	$43	$44	$33	$42	$44
Rainfall (mm)	500	540	530	807	486	435
ROAM (%)	na	2.8	3.6	3.2	4.2	4.6

4. Soils improve

Research results released recently by Drs Jones and Earl from UNE, showed that on one New England property, which previously had a long history of superphosphate application, the available soil phosphorus levels rose as shown in Table 6.

Available soil P has doubled without the addition of more fertilizer. This result has been replicated on both "Burra Downs" and "Grindstone Bay", in Tasmania.

Table 6. Soil Phosphorus levels (ppm P) at "Lana", NSW.

Date	Continuous Grazing	Cell Grazing
March 94	4	4
December 94	7	5
November 96	11	22
October 97	8	16

5. Rainfall effectiveness has improved

Figure 3 shows the trend in rainfall use efficiency from 1994 to 1997 for "Wirranda", a Central Queensland property. The trends are typical of those in other areas of Australia where carrying capacity of continuously grazed country steadily declines, while that under cells continuously improves. Doubling effective use of rainfall has proven to be an achievable goal within 5 years in most areas in Australia, where cells have been in operation for that long. That also fits with long term international trends. This translates into higher carrying capacity.

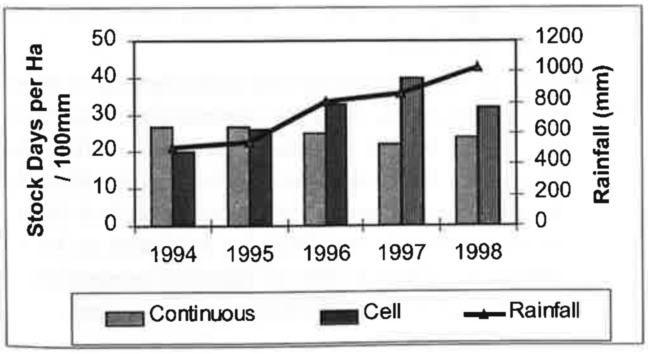
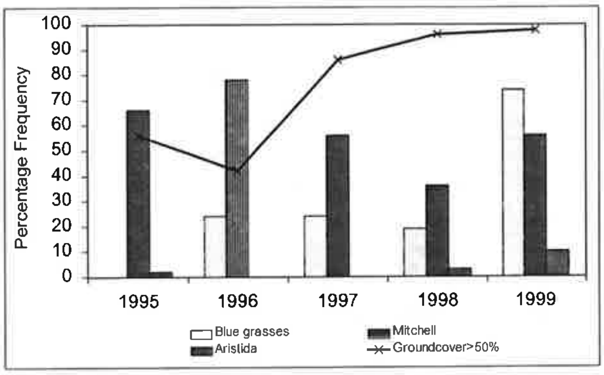


Figure 3: A comparison of water use efficiency in cell grazed and continuously grazed paddocks on "Wirranda", a Central Queensland property.

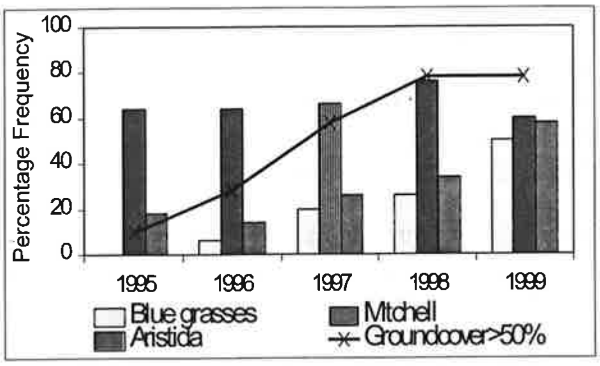
6. Pastures have improved

Cell grazing reverses the decline of perennial grasses. This has been demonstrated by the work of Drs Earl and Jones at UNE and hundreds of graziers. The data below in Figure 4 is representative of the national trends. It shows the frequency of perennial species increasing under cell grazing at the same time as stocking rate is increasing, relative to continuous grazing. 1994 and 1995 were drought years with half the rainfall totals of 1996 and 1997.

Figure 4: Frequency of occurrence of perennial species under cell grazing at "Somerville", Richmond.



GRASSCheck Site 1 located 0.5km from water point.



GRASSCheck Site 2 located 1km from water point.

7. Animal performance usually improves

Two recent surveys of our NSW clients showed the following:

The survey results show that animal performance (per unit) can therefore be lower in a proportion of cells. A number of management errors, including the use of dams as water sources, were identified as the major causes of poorer performance. Untreated mineral deficiency was identified as another cause. While production per head may be lower in 10-20% of cells, production per hectare is invariably higher.

	Mail Survey	Workshop Survey
No. of respondents	20	60
% with higher performance*	50%	30%
% with no change	40%	50%
% with lower performance*	10%	20%

* *Performance was judged relative to experience prior to cells.*

Summary

An estimated 20-30% of Australian graziers have now heard of cell grazing. Some 3-4% have had limited exposure to the theory, some 0.9% have had basic training and about 0.5% have adopted the practice. The adoption rate amongst those who have had basic training in the technology is over 60%, which is incredibly high for an adoption rate of a complex agricultural practice.

The introduction and marketing of cell grazing in Australia has created a paradigm shift, which is currently only a quiet ripple throughout the country. This ripple will become a wave in the next 10 years and a tidal wave within 20-30 years, as the new paradigm becomes the established practice.

The generally held non-commercial attitudes to Cell Grazing are at considerable variance with the commercial experience. The differences between much of the literature and the commercial results appear to be due to several factors:

- Inconsistent terminology has lead to different techniques being researched from those being used by graziers. Additionally, the techniques being used by the innovative graziers are also changing over time as more knowledge and experience is added. The Cell Grazing method being used in Australia today is a far cry from that called High Density Short Duration grazing by Allan Savory and Stan Parsons in Zimbabwe 25 years ago, and has even changed in some respects from that taught in Australia only five years ago. It is thus an evolving knowledge and experience base.
- Lack of both awareness and understanding of these differences by the scientific community is a problem in itself. It is a popularly held belief that the techniques differ in name only but not significantly in substance. People who must make their living from grazing do not find the subtleties to be so academic. There is also no apparent recognition of the changes which have been made over time.

- There appears to be a reluctance to accept producer experience as valid knowledge. This has led to the demonstrably false belief that good information can only come from a replicated trial which is duly written up in a recognised journal. Because of its holistic nature, Cell Grazing is very difficult to research using traditional statistical models. This may be partially overcome if more effort were expended on understanding processes rather than attempting to measure questionable outcomes.
- There is little doubt however that the rapid growth and expanding interest in Cell Grazing in Australia will ensure that the public sector catches up eventually. The risk however is that no matter how much of a leap is made, that without a change of attitude, it will always lag behind the industry innovators.

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