

## CHAPTER 12

# A little bit of a bloody big amount

The nation that destroys its soil destroys itself.

FRANKLIN D. ROOSEVELT

**It is the mid-1960s.** Zimbabwe is in the grip of a civil war which has its roots in white colonialism. As part of the war effort, a young scientist is put in charge of a 'tracker combat unit.' Even though he is hunting humans he is constantly observing and thinking about the condition of the land over which he pursues his quarry. He tracks people over game areas, tribal areas and commercial farms. Everywhere he inspects plants and soils, looking for the signs of human passage. What he learns may one day help provide an answer to man-made climate change and improve the prosperity of nations.

A shift of time and continents: to 2009, Australia. Michael and Anna Coughlan have just bought a farm, *Moombril* near Holbrook, New South Wales, and are about to surprise their new neighbours by selling off a large number of its assets. These include two houses, the shearing shed, the hay shed, the machinery shed, two garages (and the four vehicles in them), even some spare sheep dip. At the sale, whispers of incredulity can be heard passing among prospective local buyers.

Using part of the money raised, they purchase some fencing materials and two motorbikes. People think they are crazy.



It's about a year after the Coughlan's farm sale and I'm in New South Wales myself, flying in to the tiny airport of Armidale with a farmer called Bruce Ward. We are met there by his business partner, Tony Lovell.

Tony is a big chap, tall, solid and with a manner you can only describe as 'cheeky.' Bruce is a bit more serious. Tony starts sentences with 'Imagine if . . .' whereas Bruce will open with "The thing you need to realise is . . ." Tony will laugh out loud, Bruce will chuckle knowingly. But Tony's playful nature can't hide his serious intent. He and Bruce are going to save the planet.

As Bruce and I load our bags into their Landcruiser, Tony tells me that our first port of call will be a farm that sacrifices Poms in an ancient soil fertility rite. I am to be an offering to the gods. This sets the tone for the next few days. We will cover over a thousand miles as Tony and Bruce take me to a string of farms that are redefining the way we think about agriculture and that offer a model for mitigating global warming while delivering sustainable increases to food production and bringing the cost of that food down. What's so striking about what they propose is that rather than using new technologies these farms are using a very old one. "The thing you need to realise is it's a technology that's been around for millions of years," Bruce tells me.

In the process I will learn what links a tracker in the Zimbabwean civil war to Michael and Anna Coughlan's asset sale in modern day Holbrook.



Australian farming has become synonymous with drought. A decade of low rainfall, heat waves and wildfires has scorched much of the nation. Australians call it 'The Big Dry' and it's brought acute hardship to rural communities. When the rains

come, as they did to some parts of the country in early 2010, water runs over the parched surface often resulting in devastating floods. It's as if the land is now so unfamiliar with water it no longer knows how to drink. The drought, it is said, remains deep in the soil. Farmers across the continent are suffering. Agricultural debt has increased from just over ten billion dollars in 1994 to nearly sixty billion dollars in 2009. Many of the farms we drive past on our journey are surviving on 'drought assistance' payments handed out by the government. Australia is worried about food production. Some believe the only way for the country to survive is with a reduced population. I'm here to investigate another solution.

'Imagine if you could take billions of tonnes of carbon dioxide from the atmosphere every year, safely, effectively, economically and immediately,' says Tony as we get underway. 'Imagine if you could do it in a way that also increases biodiversity, boosts food security, reverses the advance of the desert, and improves rural communities.'

I'd first heard this pitch in Manchester, England, before setting out on my journey. Tony had talked at an event called 'The Manchester Report' held in the gothic splendour of Manchester Town Hall, a kind of serious game show for climate change initiatives. Over two days, twenty short-listed ideas were presented to an expert panel and live audience. Tony's presentation stood out for two reasons. First, he's a very engaging speaker, combining authority with an approachable and light manner that makes you want to go to the pub with him. Second, what he said was extraordinary. The panel was 'hugely impressed' and so was I. It seemed too good to be true.

I introduced myself to Tony after the event. Bruce was there too, but couldn't get a word in edgeways as Tony and I fell into the worst kind of joke one-upmanship, something we've slipped right back into here in Australia. During long hours travelling, Bruce sits in the backseat alternately chuckling and dispensing wisdom against a barrage of puns and innuendos. When Bruce suggests a turning to Eubalong (pronouncing it 'You-abbah-long'), for instance, Tony replies with 'You have a long what? Try

to keep it clean, Bruce.' Everything they say about Australian humour is true. This goes on solidly for four days.

The jaw-dropping moment in Tony's Manchester presentation involved two photographs. 'This is a typical ranch in Mexico,' he explained, showing an image of an arid terracotta dustbowl with sparse vegetation and bare, compacted soil. Then he put up a second image showing a property awash with lush green vegetation. The contrast couldn't have been stronger, which made what Tony said next so astonishing. 'This is the ranch next door. Same soil, same rainfall. These pictures were taken on the same day.'

Tony and Bruce have a bunch of these photos, which they share with me over the coming days. Some of the most striking are aerial shots that show neighbouring properties from above. The difference between vegetation and bare soil follows the line of the fences separating adjoining farms.

'What's the difference?' I ask.

'Management,' says Bruce. 'Just management.'



About an hour after leaving the airport we arrive at Lana, the property of Tim and Karen Wright, where they farm Merino sheep. Tim isn't convinced about man-made global warming. He thinks politics 'has got in the road' and 'there's a lot of hidden agendas going on at the IPCC.' That hasn't stopped him and Karen from following Bruce and Tony's advice. We sit drinking lemonade on the veranda overlooking a green and fertile landscape. It looks more like Sussex than the images of the Australian bush I'm used to seeing on TV.

Tim and Karen ask me where I've been on my travels. When I mention my trip to Konarka, Karen disappears inside. A moment later she brings out a sample of the company's Power Plastic, the same stuff I'd seen rolling off that 'big printer' in New Bedford. 'We're a distributor for New South Wales,' she says.

I guess in a country synonymous with drought it makes business sense for a farmer to diversify into selling solar panels.

'Is this a business for if the drought gets worse?' I ask.

There's an awkward silence. Clearly I haven't got it.

'We don't feel the drought like other people do,' says Tim. 'Our reservoirs are still three-quarters full.'

The Big Dry isn't so big here it seems. But though Lana isn't feeling it, many of its neighbours are. Local farms that have been in families for generations are being sold off as the farmers have become unable to make a living. 'Some are suicidal,' says Tim grimly. He should know, having worked as a counsellor. His talk of rural suicide won't come as a surprise to anyone who lives in Australia. A widely quoted statistic is that one farmer kills himself every four days. That figure is actually a decade old but things have hardly improved in the intervening period.

Tim tells me the rainfall has been low for *nine years*. Yet despite this, Lana is flourishing with high levels of livestock, tripling since 1980 from 7,000 to 22,000 'dry sheep equivalents,' or DSE. When I started this trip, I had no idea I would find myself getting to grips with sheep-based metrics. DSE figures are a way to compare farm capacities and performance. 'One DSE' is the amount of feed needed by a two-year-old Merino sheep of the sort Tim and Karen farm. A pregnant ewe might be 1.5 DSE, a cow nursing a calf ten times that. Bruce tells me the usual labour ratio is one man per eight thousand DSE. Tim is running at one man to 15,000.

'Tim and Karen are operating at full capacity with months of feed in front of them, where all around them is panic,' says Bruce. 'The neighbours look at us with envy,' adds Karen. 'They say "you must have had a lot of rain here."' She laughs, though without humour. 'We've had the same rain as everyone else.'

Something is clearly going very right with this farm, but it's not the only one – and Tony is eager we get on the road so I can see more. We've a long way to go.



We've been driving for about an hour when Bruce asks Tony to pull over. 'Let me show you something,' he says.

As we get out of the car Bruce directs my attention to a paddock by the side of the road. The ground is almost totally bereft of vegetation – the sort of landscape you expect a man in a spacesuit to be walking across.

‘Is that the lack of rain?’ I ask.

‘Look down the fence,’ says Tony.

And then I see it, and from that moment on, I see it everywhere we go. Outside the fence there’s grass. In fact, we’re standing in it up to our knees. Inside the fence it’s practically desert.

‘Things can grow just fine here,’ says Bruce. He bends down and grabs a lump of vegetation. It comes away in his hand. ‘This is dying, though,’ he says. ‘That’s the other half of the problem.’

Back in the car Bruce tells me the story of a man called Allan Savory, who pioneered the farming methods employed by Tim and Karen and everyone else I’m going to see on this journey into Australia. Savory was the previously-mentioned tracker in the Zimbabwean civil war of the 1960s, and before that was the provincial game officer in the Northern and Luapula Provinces of Zambia (then the protectorate of Northern Rhodesia).

‘Savory was trying to understand the continuing problem of land degradation, like what you’ve just seen in that paddock. His first instinct was that it must be something to do with the cattle, things that humans had inserted into the landscape in place of the natural wildlife. But it turned out it wasn’t the animals, it was the way they were being managed.’

Tony interjects, ‘If you go back in time, our grasslands were dominated by large herds of grazing animals, bison in America and wildebeest in Africa.’

There are still a few places where you can see what Tony is talking about. The Serengeti, for instance, is one of the few remaining natural grasslands on the planet and is home to huge migrating herds of wildebeest and zebra. There is no beginning or end to their journey, but a constant clockwise pilgrimage in search of water and fresh grass. Every year roughly two million animals cover eighteen hundred miles. The herds stay closely packed as a defence against predators like lion, cheetah and hyena.

‘What happens is the herd eats the grass but then moves on looking for the fresh stuff. In the Serengeti, that herd won’t be back on the same ground for up to a year or so,’ says Tony.

‘That’s important,’ says Bruce. ‘Savory realised there is a natural relationship between grasses and grazing animals. The growing buds are at the base of the plant and they need sunlight. If the plant gets too tall it starts to kill itself by hiding those buds in its own shade. It can’t photosynthesise.’

‘That’s why that grass came away in my hand,’ explains Tony. ‘It’s dead material. In nature the herd would have come along, eaten the tops off the plants exposing the growth buds and moved on. By the time they came back, the grass would have regrown. The animals have another go and so on and so on. The plant *needs* the animal to keep it alive.’

‘The problem with the way we farm livestock is we don’t let them roam,’ says Bruce. ‘We split up big herds between separate paddocks and keep them there for way too long. With no predators they can wander where they like in that space. They don’t stick together, which means they quickly eat all the grass in an area. Worse than that, the grass never gets a chance to grow back. An animal will have a go at it as soon as it starts sprouting. It’s a vicious circle, with the animals destroying their own food. That’s what you saw in that paddock back there: desert inside the fence and tall but unhealthy plants outside it – overgrazing and undergrazing side by side.’

For the next four days I see this pattern of overgrazing and undergrazing repeated everywhere we go: miles upon miles of fences separate sparsely vegetated paddocks from verges of dried-out and withering foliage.

‘Why doesn’t anybody notice this?’ I ask.

‘Did you notice it?’ responds Tony. It’s a fair point.

Bruce, ever wise, says, ‘When you’ve grown up with something that’s always looked one way, then you can’t see it should look any different.’



We spend the evening at the Overlander Motel in Gunnedah, the 'Koala Capital of the World.' Checking in I notice the establishment sells a product that only Australia could have come up with – the 'StubbyGlove.' Dubbed 'the greatest innovation in beer drinking technology since bubbles,' it's a glove made of neoprene rubber with an inbuilt beer bottle holder. ('Stubby' is Australian slang for beer bottle.) The idea, say the inventors, is that if you fall down you won't drop your beer. I like the idea of a product that allows you to hold on to precious things during accidents, but only in Australia is falling over more of a trial if you've lost your *beer* and not just your balance.\*

'Is that for real?' I ask the receptionist, finding it hard to hide my amusement.

She ignores me and turns to Tony.

'What's his problem?'

'He's a Pom.'

'Ah,' she says nodding. Clearly this explains everything.

We eat in the motel restaurant, which serves up simple hearty meals heavy on meat. I use the opportunity to talk about the main reason I'm here: the climate change angle of Tony and Bruce's work.

'Look,' says Tony. 'Even if there was no man-made global warming problem, what Tim and Karen are doing makes sense for their business. The good news is that the environmental benefits come screaming out the back end of it anyway.'

Those 'environmental benefits' include the removal of carbon dioxide from the atmosphere at potentially massive levels as well as increasing biodiversity. Tony elaborates: 'There has been a huge decline in soil carbon levels across the grasslands of the world over the last hundred and fifty years which is directly related to the loss of vegetation. That paddock we stopped at? The soil carbon there would have been almost nonexistent.'

\* The product originally had slightly loftier ambitions. The idea was born during a skiing trip to the mountains of New South Wales. Glen Krummel and his brother Leon watched their mate Jim, who had lost his arm in an accident years previously, struggle to keep his hand warm but his beer cold. The StubbyGlove was born, and as soon as the friends started using them, publicans began asking for branded versions. They've sold over a hundred thousand.

Beers arrive and we elect to use our own hands to hold them despite the StubbyGlove option. As we drink, Bruce explains that grass plants grow roughly the same amount of root matter as leaf matter – they're in balance above and below the ground. If the plant gets nibbled by a cow or sheep, it'll slough off a corresponding amount of root matter into the soil within minutes.

'Now a plant is fifty-eight per cent carbon . . .' says Bruce.

' . . . and carbon is good for the soil,' I say, remembering what I'd learned on my trip to New Zealand.

'Very good,' says Tony. 'Clearly schooling has improved in the UK.'

'But that carbon can't do anything to offset global warming, can it? I mean, nearly all of it is going to return to the atmosphere as the biomass rots.'

'Right again,' says Tony. 'But the crucial words in your last sentence were "nearly all." When organic material decays, it leaves behind a small amount of residue in the soil.'

'Humus,' says Bruce, giving that residue its scientific name.

'No thanks,' says Tony. 'I think I ordered the steak.'

Bruce ignores this (he's used to it). 'That residue, the humus and charcoal components stays in the soil in a natural system.'

'It's only a small amount of the carbon that made up the plant,' says Tony, 'but a little bit of a bloody big amount soon adds up.'

'Does this work in reverse?' I ask. 'If there isn't vegetation, does the soil start to lose that stable carbon?'

'Yep. That's why conventional agriculture can bugger up a pristine ecosystem so quickly. That's what we've been driving through all day.'

I'm arrested by a thought and look Tony straight in the eye.

'So let me get this right. You're saying agriculture has released billions of tons of carbon into the atmosphere *from the soil*?'

'Yep.'

'You're telling me that the culprit in global warming isn't just the Industrial Revolution, but the *agricultural* one?'

Tony looks over at Bruce. 'He picks things up quick for an English fella, don't he?'

That's probably because I'm remembering something I read about the work of paleoclimatologist William Ruddiman, whose book *Plows, Plagues and Petroleum: How Humans Took Control of Climate* argues just this point. In fact, according to Ruddiman, agriculture is the reason we're not in an ice age right now.

Ruddiman's book reminds us that the planet is subject to a dance of astronomical cycles that affect how much of the sun's radiation reaches us. For the best part of the last million years, this means the Earth has experienced regular glacial cycles, with ice covering about a quarter of the planet's surface for a hundred thousand years at a time, interspersed with short ten-thousand-year 'interglacial' warm periods. The last warm period should have ended two thousand years ago says Ruddiman, but agriculture has warmed up the atmosphere and held it off. 'Farming is not nature,' he writes, 'but rather the largest alteration of the Earth's surface that humans have yet achieved.'

According to the UN's 'Livestock's Long Shadow' report, the total area of land given over to grazing amounts to twenty-six per cent of the ice-free surface of the planet. If, as Bruce and Tony are telling me, we've been managing that land in such a way that our soils have been losing carbon, then as agriculture has grown, so has atmospheric CO<sub>2</sub> as a result. This is not to underplay the crucial role of fossil fuels in accelerating that rise, but it is wrong to lay all the blame at their feet.

Some commentators worry that cattle burping methane (another potent greenhouse gas) into the sky is a major challenge to the climate and call for us to relinquish meat eating. Methane is indeed twenty-three times more potent than CO<sub>2</sub> as a greenhouse gas and the UN estimates that livestock contribute eighty-six million tonnes of it to the atmosphere every year.

But if what Bruce and Tony are saying is right, getting rid of cattle could end up being a disaster. It's not that we have too many cattle, it's that we have too little grass. The soil needs the grass if it is to become richer in humus and therefore carbon. The grass needs animals if it's not to die from undergrazing.

Working correctly together, the system is a huge natural 'carbon pump' that can take massive quantities of CO<sub>2</sub> from the sky.

'The good news is that we only need to change the way the cattle move to make things better,' says Bruce. 'It's something we can do today and it more than pays for itself. The land is the biggest thing we can control. We can't manage the seas and we can't manage the air. But we can actively manage the land. It's the single biggest asset we have in battling climate change and building biodiversity.'

Tomorrow I'll find out just how big the impact could be.



After an early rise and a six-hour drive taking us three hundred miles into ever more parched country we've come deep into an area known as the Western Division. Our journey had one stop – breakfast at the Jolly Cauli in Coonabarabran, a café that bizarrely doubles as an osteopath. This mystifies me until I see Tony order his breakfast, which seems to contain the meat of an entire cow. 'My grandma said to me, you don't get to this size by being fussy!' My guess is the osteopath makes a good business dealing with back injuries caused by standing up too soon after eating here.

Now we've arrived at *Etiwanda Station*, a farm operated by Andrew and Megan Mosely in Cobar, one of the driest places in New South Wales. Soon after arriving, Megan says, 'When the TV wants a few shots to represent drought they film out here.'

It hasn't rained in Cobar for five and half months but the Moselys are calm. Their farm is a beacon of prosperity in one of the most stressed parts of the country.

'The land hit its low point in the late 1990s,' says Andrew, handing out mugs of tea. 'Back then we'd need fifteen acres to keep one sheep alive.' In his eyes you can see the memory of bad times. 'It got so degraded it was never going to recover under normal management,' adds Megan.

'You were in a pretty dire state?' I ask.

'Yeah, we were not exactly sitting pretty. To be honest we were desperate. We needed to make some smart choices and

in the end we had to completely change the way we managed the land.'

'It was either that or give up and walk away,' says Andrew.

'Is it the same for your neighbours?'

'Many of them are living on government support. They're existing but they haven't got any kind of lifestyle. Their houses are falling down.'

Megan and Andrew's house isn't falling down. In fact, it's a comfortable, well-furnished home with modern conveniences. Sprinklers keep the lawn outside a lush bright green, and healthy-looking pets lounge in the blistering heat, occasionally teased by the couple's two young daughters, Jessica and Emily. There's a small pig house near the property and I ask the girls the names of the two pigs who live there.

'Easter and Christmas,' says Jessica.

'Those are nice names,' I say, before realizing what they mean.

Andrew takes us on a tour of the property.

'We're seeing native perennial grasses returning. We're not sowing any grass seeds, they're just coming back naturally,' he tells me.

'Where's the livestock?' I ask.

I haven't yet seen a sheep. And for a sheep farming operation, this strikes me as odd. By way of explanation Tony, who is doing his own bit to irrigate the land, says, 'One of Allan Savory's central ideas is you get all your animals into big herds, like they would be in nature.' Zipping up his fly, he continues, 'What that means is that most of the property won't have animals on it for most of the time. They're all together in a small area.'

'That's what gives the grass time to grow back,' says Bruce.

'How do you keep them all together?' I ask.

'That's easy. You build lots of small paddocks. Leave them in each one for a day or two and then move them to the next.'

'The biggest cost is fencing,' says Andrew. 'You have to put in a lot of fences to divide up the property that way.'

After all my investigations into the cutting-edge of technology and medicine I'm struck forcibly by what Andrew has just said.

‘One of the answers to global warming is *fencing*?’ I ask. ‘This is the technology we’re talking about here? You’re saying pulling carbon dioxide out of the sky is a matter of fences?!’

‘Yeah,’ says Tony, shrugging. ‘We reckon it’s something even a Pom can get his head around.’



Over dinner I turn the conversation to soil carbon levels. I want to know if the Moselys have seen levels rise the way Bruce and Tony are saying they should.

‘We had some scientists up here from Trangie Research Station and the University of New England,’ Andrew tells me. ‘They reckon the carbon went up about fifty per cent over three years.’

‘It was ridiculously low to start with, though,’ Megan interjects. ‘So fifty per cent of very little is still very little.’

Tony wants to know the exact figures. Megan pulls out a file and reads carefully.

‘It went from 0.6 per cent to 0.88 per cent in the top fifteen centimetres of the soil,’ she says, her finger tapping the page. ‘It’d be higher now. We’ve had a bumper grass crop this year.’

Lightning fast, Tony does a rough sum in his head. ‘That’s about five tonnes of carbon per hectare then,’ he says.

That sounds like a lot of carbon for such a small percentage change but the figures stack up. An average soil weighs about 1.2 tonnes per cubic metre. A hectare is ten thousand square metres so digging down a metre gives you twelve thousand tonnes of soil. An increase of just 0.28 per cent in soil carbon as seen at Etiwanda Station therefore amounts to nearly thirty-four tonnes per hectare measured to a metre deep. Andrew and Megan’s soil had only seen new humus penetrate the top fifteen centimetres. In time root matter will easily reach further, but for now it means that figure of thirty-four tonnes is reduced to a smidgen over five tonnes per hectare for the Moselys’ farm. Tony was spot on. That’s fast maths.

In relation to climate change, though, there’s another step in the calculation. Every extra atom of carbon that’s now in the soil

has got there thanks to photosynthesizing plants, which means it was originally part of a carbon dioxide molecule in the atmosphere. Because carbon accounts for only 27.3 per cent of the weight of a carbon dioxide molecule, five tonnes of soil carbon is the equivalent of roughly 18.5 tonnes of CO<sub>2</sub> pulled out of the sky. Extrapolating the increase in soil carbon over the Moselys' 26,000 hectares gives a figure of 480,000 tonnes of sequestered CO<sub>2</sub> from the atmosphere.

To put this in context, this is equivalent to offsetting the CO<sub>2</sub> emissions generated by over eighty-five hundred Australian citizens over the three-year period (and when it comes to per capita emissions, Australia is one of the world's worst offenders, with figures nearly triple that of your average European). As Tony said in the restaurant last night, 'A little bit of a bloody big amount soon adds up.'

'For pretty much any soil type, if you increase organic matter by a full one per cent to a depth of thirty centimetres, you sequester roughly a hundred tonnes of CO<sub>2</sub> per hectare,' says Tony, taking a suck on a stubby. 'It doesn't matter if it's degraded soils like here and you move from say 0.5 per cent to 1.5 per cent, or a Scottish moor where you've got fifteen per cent organic matter already in the ground and you take it to sixteen per cent.'

Published research is full of examples showing how changes in grazing management can deliver increased levels of soil carbon. For instance, the *Blackstone Ranch* in Rancho de Taos, New Mexico, sequestered over 13,600 tonnes of CO<sub>2</sub> over ninety-four hectares in just one year (that's nearly 145 tonnes of CO<sub>2</sub> per hectare per year), while doubling its livestock and increasing gross income by 395 per cent.

The UN's Food and Agriculture Organisation estimates there are 3.5 billion hectares of agricultural grasslands on our planet. If we could increase organic matter in these by one per cent, this would offset nearly twelve years of global CO<sub>2</sub> emissions. Some nations have already caught on. In July 2009, the Portuguese government introduced a multimillion-dollar soil carbon offset scheme based on dryland pasture improvement covering

forty-two thousand hectares and compliant with the Kyoto Protocol. The scheme pays farmers to establish biodiverse pastures to increase soil carbon.

Paying farmers for soil carbon increases could encourage more landowners to follow Andrew and Megan's example, and this is something Bruce and Tony have been tirelessly campaigning for.

After dinner, I ask a question that's been in the back of my mind since yesterday and one I'd nearly put to Tim and Karen.

'Could you not take over failing farms and do to them what you've done here? Are you tempted to buy other properties?'

Megan laughs. 'If I had a bucket of money I'd buy the whole Western Division. You could do it; do up each farm, put in the fences, get the stock moving right. Yeah, you could take on places and restore them like you restore a house.'

'If you had a bucket of money?'

'If we had a bucket of money.'

Tony is smiling and I think I know why. There's a reason he can do complicated arithmetic in his head in double-quick time. You see, he has another side to him. He isn't a farmer, or an agricultural scientist, or a soil carbon expert by profession. He's an accountant, and a very successful one.



A new day, another six hours on the road and a further three hundred miles bring us to the house of Ken Haylan, a retired businessman who now farms cattle at Hailiebrae outside the town of Blayney. Ken is in his sixties and manages the farm pretty much by himself. He's been following Bruce's advice for two years and on the journey down, Tony had told me another of his too-good-to-be-true statistics and I want to find out if he's pulling my leg.

Over lunch I ask Ken about his figures. 'Tony tells me your costs of production are pretty low.'

Ken considers for a moment. 'Yes. Although we're not fully stocked at the moment so it's a little higher than it could be.'

‘Can I ask you your per-kilogram figure?’

Ken tells me, my jaw drops and Tony smiles. You see, the average cost of production for a kilogram of beef in New South Wales is Aus\$1.60. Ken has just told me his costs are ‘about fifty-three or fifty-four cents.’

He continues. ‘At full stock it’d be about forty cents.’

‘But that’s a *quarter* of the average figure?! You’re telling me you can sell your meat cheaper than your competitors can produce it and take a huge profit margin at the same time?’

‘Something like that,’ he says nonchalantly. ‘Would you like another slice of quiche?’

I’m taking this in when Ken adds, ‘What unites all the farms you’re seeing is that they are ‘low input’ operations. They mimic ancient grazing patterns within the parameters of a modern agricultural holding. It is the antithesis of most modern agricultural practice with high cost inputs and reliance on a chemical fix for a problem rather than seeing the productive base, the land, as a whole.’

Since he’s started following Bruce’s advice, Ken says he has more grass in his paddocks when his cattle are leaving than other farms have waiting for their livestock entering a new field.

‘Don’t your neighbours wonder about that?’

‘Oh yeah, but they’ll never change.’

‘The problem is that farming’s a traditional business and it stays in the family,’ Bruce explains. ‘Changing the way you farm is the same as saying that what your pappy and your grand-pappy did was wrong, which isn’t easy when they’re still living on the property.’

It’s a common theme. Tim, Karen, Andrew and Megan had told similar stories. This is one of the reasons Tony wants Australia to follow Portugal’s example and experiment with paying farmers for the carbon they sequester in the soil.

‘It’s a carrot instead of a stick,’ he says. ‘It’s hard to change when everything’s going to hell, when you’ve got to admit that the way you’ve been farming isn’t working so good and all the while your dad’s telling you to stick with tradition. But if you can pay them for the carbon, that gets them out of both holes – financial and

emotional. The land improves, which is good for business, and they can tell pappy the change in management is to bring money in from something he never could have got paid for. It's not that the old man was wrong at all, it's just a new market: carbon.'

'But even without carbon credits, they can see the difference just looking over the fence, surely?' I'm slightly incredulous.

'Well, these are special Australian fences,' says Tony. 'They're impervious to new ideas.'

For once, he's not joking.

'Yep, you're never a prophet in your own dunghill,' suggests Bruce sagely.



One day later, two hundred and fifty miles south, and I'm in an argument with perhaps the smartest farmer in Australia.

Graham Strong is not short of opinions or knowledge. He's vehemently opposed to genetic modification, for instance. I've mentioned the argument that selective breeding of plants and animals is a form of genetic modification and am now listening to an extremely educated rant about the difference between transgenic modification of species (the practice of taking a gene from one organism and deliberately inserting it into the genome of another) and selective breeding. 'It's not the same and I hate it when people try to say they're equivalent!' Graham exclaims. I'd only raised it as a talking point, but our host has gone in for the kill. Tony is standing quietly to one side with the traces of a smirk on his lips. I think he's slightly enjoying the Pom getting an Outback-style bashing.

'Passionate' doesn't come close to describing Graham, who manages Arcadia at Boree Creek just outside the town of Narrandera. When he talks about the land, it's like he's referring to a brother, but don't let that give you the impression he's some tree-hugging hippie. During his polemic about genetic modification, he reveals an impressive level of knowledge about many of the subjects I'd discussed at Harvard Medical School.

He believes we need an urgent debate about how we operate

in society, about the relationship between our urban centres and how we produce our food, share water, share resources.' Part of his contribution to that debate is getting involved in large public art projects that take an appreciation of the land to new audiences. 'You can't get upset with someone being ignorant about what you do if you've done nothing to tell them about it,' he declares. 'It's not that you can't farm this land. You just can't farm it the way you used to.'

Some people, though, may not want to hear Graham's most controversial view: he doesn't believe in drought.

With the hardships being suffered throughout the Australian farming industry, this sort of talk can get you lynched. 'I'm careful with the sensitivities, I understand them, but the word "drought" means nothing without a cultural context,' he tells me, his tone ever insistent.

'Our cultural context is the fact that our western lifestyle is at odds with the reality of our climate.'

'But you can't deny the rainfall is low.'

'Well, what's low? It's lower than we're used to, but there's still enough water if you manage the land right.'

In a repeat of what I'd seen at Lana, Etiwanda Station and Hailiebrae, a tour of Arcadia earlier in the day had shown me a healthy farm with abundant crops of saltbush, a feed for Graham's sheep which delivers leaner, more succulent lamb.

Part of the reason these farms are prospering, even during The Big Dry, is because when the rain does fall, their soils retain more water. According to the Soil Carbon Coalition, an Australian non-profit that works to spread soil carbon knowledge, 'organic matter can hold four times its weight in water.' This means that a one per cent increase in organic matter relates to an extra hundred and fifty tonnes of water storage available per hectare. For a nation in the grip of The Big Dry, that makes a huge difference and it's one of the reasons Tim and Karen were able to tell me 'our reservoirs are still three-quarters full.'

'The word "drought" implies impotence,' says Graham. 'That nothing can be done. End of conversation. Well, no thanks.'



Our last stop is a farm called Moombril near Holbrook, owned by Michael and Anna Coughlan, the couple who surprised their new neighbours by selling most of the property's assets as soon as they bought it. After another hundred miles and two hours of jokes, I'm finally looking at a cow. Having spent the last four days talking to livestock farmers and seeing only family pets and pigs named after the holidays they'll be eaten on, I've told my hosts I want to see some beef on the move so Bruce, Tony, Michael Coughlan and I are in one paddock, looking into another which contains two thousand cattle – one of the large herds that mimic those that roam natural grasslands.

These cows won't return to the paddock they're currently in for perhaps a hundred and fifty days, giving the grass they're now happily munching on plenty of time to recover. In fact, the paddock we're looking at them from (and where they'll head next) has grass up to our knees. As far as I can see, there's greenery.

Michael would normally ride out here on one of the two motorbikes he and Anna bought with the proceeds of their asset sale. 'It's just as easy to open a gate for two thousand cattle as two hundred,' he says.

'Is it really as simple as it looks?' I ask.

'Well, in principle, yes. The key to what we're doing is we've really dumbed it down, just simplified it and kept discipline with that. Because the animals are out here doing the work, the system kind of runs itself. We don't need to spend money and time on other inputs like fertilisers or pesticide sprays.'

Ken Haylan, the man who'd blown my mind with his tiny production costs, had said something similar. 'If you do it right, there's not much you should be spending money on,' he'd told me. 'You don't fertilise so you don't need a tractor; you don't need to spray because you don't have a major weed problem; and your cattle's health improves too.'

Neither Ken nor Michael need to drench their cattle for worms. (Ken drenches cattle he buys once on purchase, 'and that's only because I don't know where they've been.')

'It's tiring just watching some of my neighbours,' says Michael. 'I have been asked what I do all day.'

'What do you do all day?'

'Well, we've just bought another farm to move over to this system, so that's keeping me pretty busy. But while I'm working there, putting in the fences and all the rest, I know my land here is going forward, which is a really nice feeling. It takes a lot of work to get the system right, get the fences right, the grazing plans sorted. It takes a good deal of thought.'

He pauses.

'The thing is, in Australia and America we've absolutely pilaged our land. We've just fucked the whole thing. But I think we can turn it round really quickly.'



We're on the long drive back to Sydney and, ironically, it's raining. I turn to Tony. There's something I've wanted to ask ever since our conversation over dinner with Andrew and Megan at Etiwanda Station.

'You're going to buy farms, aren't you?'

'Oh yes.'

'How many?'

'We're starting with two and a half million acres. We're going to take large swathes of Australia and make it look right. Our minimum ambition is ten million acres. Then we'll move into other countries.'

'Can you raise the sort of money you'll need to buy the land?'

'We are working on just that.'

He's not kidding. I meet Tony in London some months later where he's holding meetings with large European pension funds who want to invest in long-term, sustainable assets. He's grinning like a Cheshire cat.

'Ah! Pomster!' he exclaims. 'Let me buy you a beer.'

Tony and Bruce want to save the planet. And they're going to make sure they have a whole heap of fun doing it.