Greenhouse Emissions Sandy - march 2009

We understand that the greenhouse hypothesis cannot be proven, but theory strongly favours its acceptance, in which case the world faces catastrophic changes in climate over the course of this century. We therefore feel obliged to minimise our carbon dioxide emissions.

Minimising carbon emissions is a particular problem for the dairy (and wool and red meat) industries because the ruminant species (sheep, cattle and goats) depend on producing methane as part of their normal digestive process. Methane is a powerful greenhouse gas. When the amount of methane released by livestock is adjusted for the ability of methane to trap heat in the atmosphere a "CO2 equivalent" can be calculated. An audit of Australian emissions in 2006 calculated that 10% of greenhouse emissions were in the form of CO2 methane from ruminants.

We estimated the net CO2 emissions for our vertically integrated business for 2008 to be:

Total emissions from our 400 ha of crop	100
Emissions as methane	2615
Off road fuel use (for farming)	35
On road fuel use (not freight)	70
Electricity*	56
LPG (used for pasteurization & hot water)	165
Sequestration in post 1990 tree plantings	-233
Total net CO2 production	**2808**

*Note that CO2 emitted in electricity purchases would be 285 if supplied as cola fired power. We have purchased 100% green power, which we estimate should be achieved at about 20% of the CO2 emissions of coal power.

Like many farmers, we are horrified when we look at the emissions of methane from our livestock. Without them we could realistically aim for a carbon neutral business – our planned substitution of solar and home grown wood boilers for our gas boiler would nearly get us over the line. Instead we have to ask ourselves whether in all conscience we can continue to recommend dairy products. In answering this question we take comfort from several lines of argument.

First methane, although potent, has a half life in the atmosphere of only 7 years. Therefore, when livestock numbers are maintained over a period of 50 years or so the amount of methane entering the atmosphere, and the amount being broken down is more or less in equilibrium, so the methane contribution from the livestock becomes carbon neutral. The dairy stock on our farm have completely displaced the beef cattle , wool producing and prime lamb producing stock that resided there for the preceding century. Furthermore the higher quality rations we feed to the dairy stock produce less methane when digested than do poorer quality pastures often used in the extensive livestock industries. Nevertheless, our production has grown so much that we estimate our CO2 equivalents from methane

are up about 600 tons per year from 1990 levels but to the extent to which our sales are at the expense of sales of cow dairy products, we can also claim credit from the methane that would have otherwise been emitted from cows.

The above discussion is a mere taste of the complexities involved in determining the net emissions from agriculture; others include the potential for good agricultural practices to increase soil carbon, and therefore sequester carbon. These complexities are one reason why agriculture has been omitted from the Federal Governments carbon trading scheme.

Nevertheless we strongly favour a comprehensive cap and trade approach to controlling greenhouse gas emissions. The cap determines how much CO2 is emitted, and the trade allocates the cost of the CO2 embedded in all products and services to those respective products and services. Purchasing decisions by citizens will then unwittingly decide whether the CO2 emitted in the course of providing them with goods and services is in the form of, for example, electricity to air condition a room, or a red meat meal, or a holiday. In the event that our net CO2 emissions were calculated to be the full 2800 tons calculated above, this would leave us to calculate that each kg of sheep milk yoghurt has about 2 kg of CO2 emissions embedded in it, and each kg of goat cheese about 10 kg CO2. By way of comparison 1 kilowatt hour of electricity is equivalent to about 1 kg CO2 (black coal; Victorian brown coal is worse). To make a practical example, a 10 g serve of marinated feta (enough to liberally cover a crustini) has the same CO2 embedded in it as 6 minutes running time of a small one room air conditioner, or a one minute car trip in a small car.

Our final consolation is that the nitrogen used to fertilise our pastures is provided biologically, through the use of clovers and Lucerne, which convert atmospheric nitrogen to soil nitrate. This contrasts with many parts of the world where dairy pastures consist solely of ryegrass, fertilized through the application of urea, which leads to CO2 emission in its manufacture, and the release of nitrous oxide, which is a potent greenhouse gas, following its application.

Are any systems truly sustainable?

The third law of thermodynamics dictates that all systems eventually run down. For example potassium is removed from the soil by plants, then exported from the farm in all farm produce. Furthermore, because potassium salts are highly soluble they may leach from waterlogged soil. One way of replenishing the soil is to apply KCl (potash), which is found in concentrated form in relatively few deposits scattered around the world. These deposits will be depleted in due course. To sustain soil potassium levels, farmers have several options. One is to limit the removal of produce to levels that permit potassium to be liberated from the parent rock, which would often send the farmer broke, and at best would remove.

Should we farm animals?