Submission To:
Agriculture and Related Industries Inquiry

Submission by:

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The Core Issue

- **The Chemical Fertiliser Industry is selling farmers a linear fertiliser solution in a non-linear global farming environment**

The Key Issues (1)

- **Chemical Fertiliser Production is energy intensive (look at the Mosaic submission)**

- **Fertiliser sourced from offshore is priced in $US and is subject to changes in offshore energy prices and sea transport freight rates**

The Key Issues (2)

- At this time, high fertiliser prices are somewhat ameliorated by high crop prices and a strong $A

- Australian Farmers have no **Plan B** for fertiliser if the $A depreciates or crop prices return to long term levels or both

The Key Issues (3)

- For broad acre dryland farmers in Australia there is currently no alternate to chemical fertilisers and therefore no way that they can manage the risks inherent in high energy prices, high international freight rates, commodity price fluctuations, potential emission taxes and the value of the $A

The Nightmare Scenario

- There is a real risk that the $A will continue to appreciate, oil will move over $US 150 bbl and crop commodity values will move back to long term trends

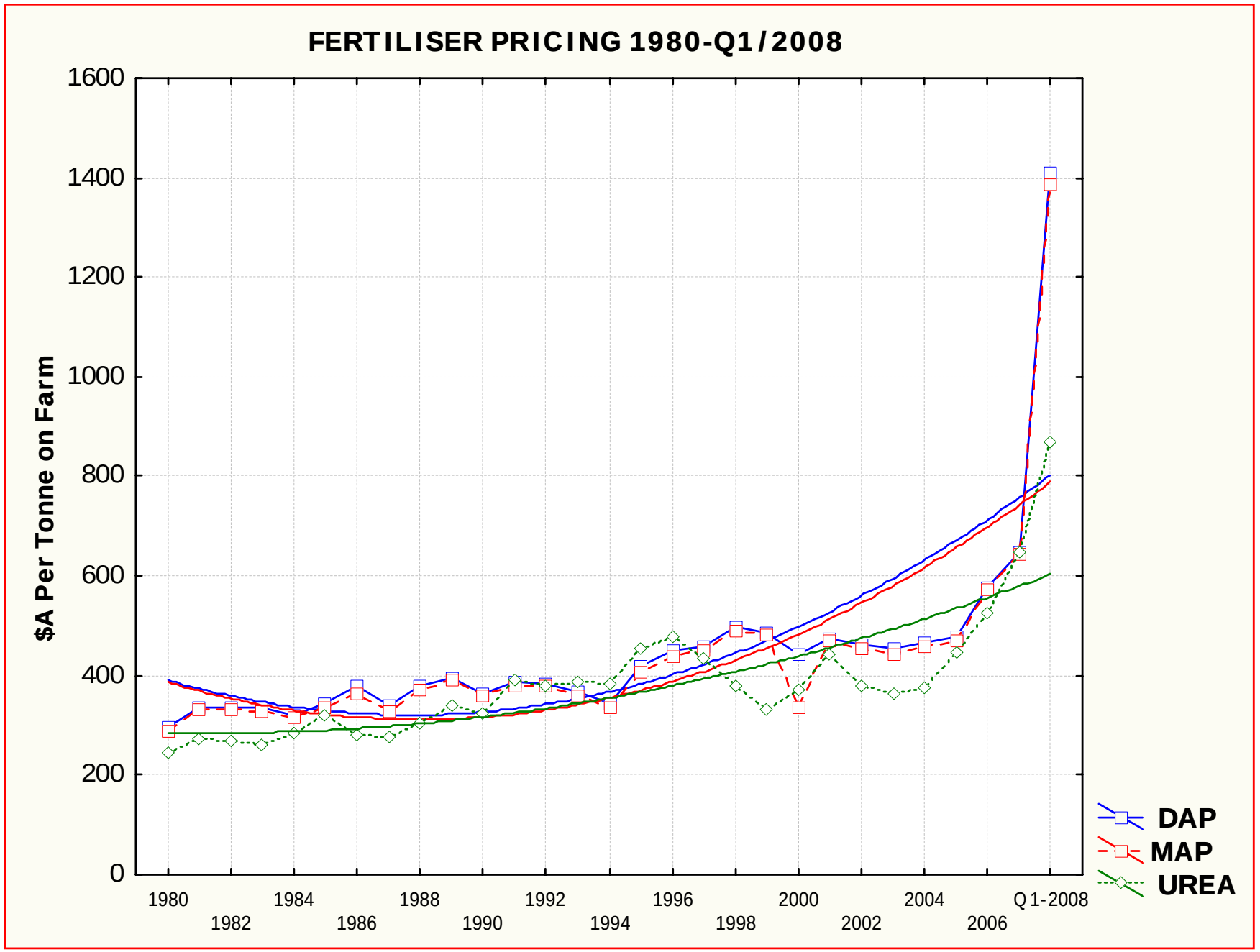
The Hard Message

- The Chemical Fertiliser Industry in Australia cannot survive in its current form in a climate constrained farming sector.

- Given the option of using $1400 per tonne chemical product or $ 250 per tonne product made from recycled nutrients the risk to the Chemical fertiliser sector is obvious

The Reason

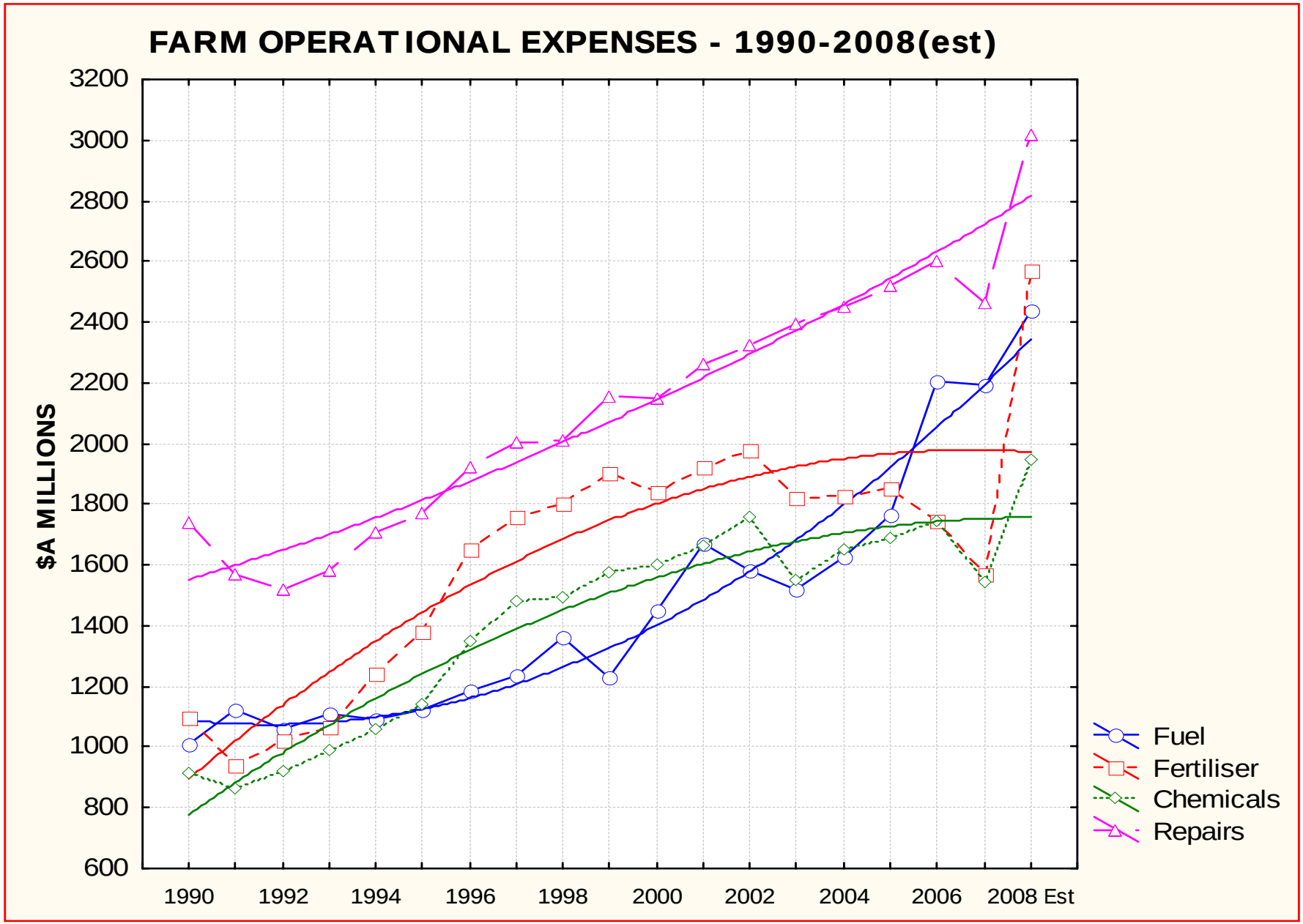
- Emission Taxes will have a serious impact on chemical fertiliser prices.
- Emission taxes will drive the need for farm and catchment level cumulative effects studies on the long term impacts of chemical fertiliser overuse
- The Data from these studies will change the chemical fertiliser usage profile going forward


FERTILISER PRICING 1980-Q1/2008
$A Per Tonne on Farm
1600
1400
1200
1000
800
600
400
200
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
Q 1-2008
DAP
MAP
UREA

The High Commodity Price Blessing

- Current high fertiliser prices can only be sustained because of all time high prices for popular cropping commodities

- This high cropping commodity pricing should be the time when farmers pay off debt and consolidate their assets – instead they are paying massive increases for fertiliser, chemicals and fuel


FARM OPERATIONAL EXPENSES - 1990-2008(est)
$A MILLIONS
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008 Est
Fuel
Fertiliser
Chemicals
Repairs

The Start of Plan B

- **In The INCITEC submission on page 17 INCITEC state :**

1.49 There are no known commercial deposits of potassium in Australia and production of potash only occurs in 12 countries.

What INCITEC Should have said

- *1.49 There are no known commercial deposits of potassium in Australia suitable for use by the chemical fertiliser industry and production of potash suitable for the chemical fertiliser industry only occurs in 12 countries.*

INCITEC went on to say

- *"1.50 100% of the potassium based fertilisers supplied in Australia are imported from North America and Europe. In 2006 approximately 299,993 tonnes of potassium based fertilisers were imported into Australia"*

The Impact

- The mining of KCl and the manufacture of potash granules is energy intensive as is the sea freight and land transport for distribution

- Australia uses valuable foreign exchange (about 155 million) to buy this product thus adding to our negative terms of trade

SUSTAINABILITY

- Potash mineral mining and processing is not sustainable – e.g. like Phosphorus the resources have a limited life

- Depending on the resource, up to 4 tonnes of CO2 and over 100,000 litres of water is expended in mining, processing and transport of 1 tonne of product

The Reality

- The Australian Sugar Industry produces over a million tonnes of molasses every year – a product that has a very high potassium content

- This Molasses is currently used as a low cost stock feed

A Local Alternative?

- Molasses can be converted into a granular product when co-blended with products such as animal manures which themselves are high in Potassium

Nutrients from the City

- In 2002 Australia's major cities dumped to landfill 5.552 million tonnes of waste organics consisting of food waste, garden waste, animal mortality and industrial food processing wastes

Note: 2002 is the latest available National data on organic waste disposal quantities.

Nutrients from the City

- This waste contained:
  - Enough Nitrogen and Phosphorus to replace at least 655,000 tonnes of DAP
  - Enough surplus nitrogen to replace 157,000 tonnes of Urea
  - Enough potassium and sulfur to replace the importation of at least 232,500 tonnes of Sulfate of Potash
  - **At today's prices this amount of nutrient is worth $A 1.193 billion**
  - The City folk paid about $276 million to bury these nutrients in landfill

Why Not Recycle Nutrients?

- The Australian community is happy recycling cans, cars, bottles, most plastics, wood, oil concrete and batteries.
- Now that nutrients are so expensive why not also recycle them as well?
- The Federal Government needs to take leadership on this issue

Phosphorus Inefficiency

- With Products such as DAP and MAP somewhere between 10% and 30% of the applied Phosphorus is taken up by the crop

- The rest of the applied phosphorus is either bound up in soil particles or lost in dust or erosion

Is All The Nutrient Required?

- Most intensively cropped dryland farms have enough bound soil Phosphorous to last for the next 20-40 years- the problem is that it needs to be made available to plants.

Phosphorus

- The price of DAP will shortly be over $1500 per tonne ($US 1230 per tonne ex Tampa on 8th of May) on Farm in the Riverina
- This tonne of DAP has 180KG of Nitrogen worth $360 ($2 per KG of N)
- And 200 KG of Phosphorus is now worth $1140 ($5.70 per KG of P)

Phosphorus

- Farmers need to query how long they can afford to be storing at least 140kg of Phosphorus out of every tonne of DAP that they buy in the soil with no guarantee that they will ever be able to recover it

Phosphorus

- At a typical application rate of 150kg DAP /HA the applied phosphorus (30kg)is now costing the farmer $171

- If the crop is recovering 30% of the applied P (9kg) (and very few are) then $119.7 worth of P is permanently bound in the soil with no current means of recovering this value

What Options

- The issues with Phosphorus binding in the soil are well understood and relate to soil pH and Redox potential

- Increased soil carbon and the use of Lime or Gypsum in the planting zone are important tools to help break out bound Phosphorus

What Tools are offered by the Chemical Fertiliser Sector ?

- None of the Chemical Fertiliser suppliers in Australia offer granular carbon based products

- None of the Chemical Fertiliser suppliers offer granulated Lime or Gypsum that is in a form that can be applied by conventional seeding equipment

Nitrogen

- The Average Dryland farm in Australia receives about 16.8KG of Nitrogen in every 100mm of rain.

- The problem is that the farm soils are now so deficient in Carbon they cannot process this nitrogen and it is lost to the atmosphere and to Vadose zone systems

The Technical Issues

- The Issues with chemical fertilisers are well recognised but poorly publicised :
  - Only small amounts of Phosphorous applied are taken off in crops
  - Normally somewhere between 30% and 65% of total applied Nitrogen is recovered in crops
  - Both Nitrogen and Phosphorous are major environmental pollutants

Chemical Fertiliser Saturation?

- There is growing evidence that the wheat farming sector may well have reached chemical fertiliser saturation point i.e. yields are declining whilst inputs are rising

Market Domination

- The Chemical Fertiliser Industry Dominates the Australian Fertiliser Sector.

- CSIRO have gradually dispensed with organic fertiliser research to focus on the revenue streams from Chemical Fertiliser Companies.

The Problem with Market Dominance

- New and better ways of delivering crop product do not get researched
- Lack of competition in the Fertiliser market place means that prices are not controlled by a competitive market place
- Serious environmental impacts do not get addressed

Water

- “Blue Water” = Surface and Groundwater – what we see running down rivers
- “Green Water” = Soil Moisture that comes from rainfall
- As climate change impacts Australia, a much larger proportion of our food and products will rely on “Green Water”

Rainfall

- In most low rainfall dryland cropping areas, soil carbon levels have dropped from a range of .9%-1.5% to as low as .2% in many areas.

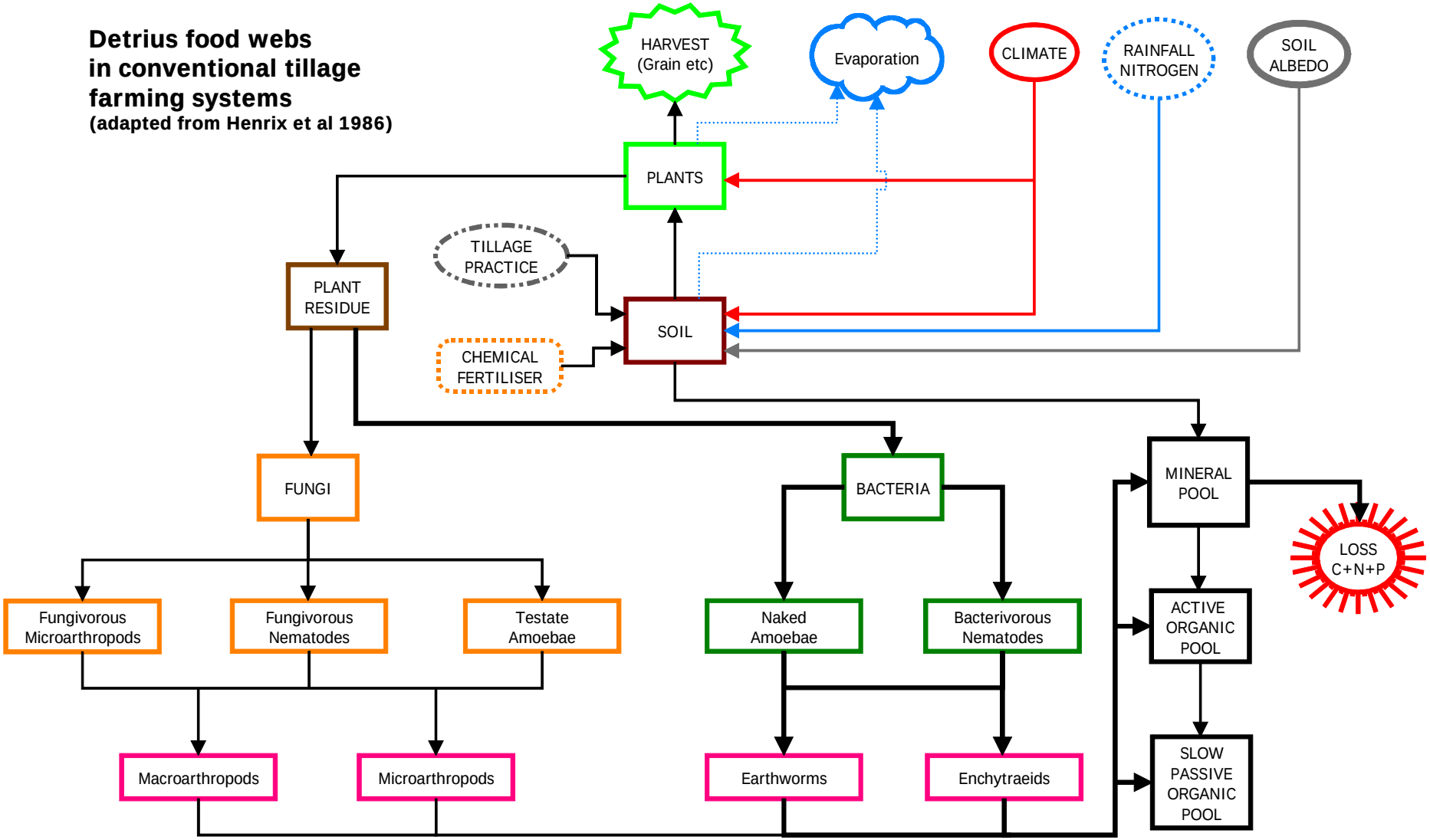
- Loss of soil carbon leads to a decline in soil structure, water holding capacity and microbial and fungal activity.

Cultivation

Intensive cultivation, chemical fertiliser use, the rapidly increasing use of pesticides and herbicides and crop trash burning have seriously depleted soil carbon levels in all irrigated intensive cropping and dryland farming areas over the last 70 years.

Lack of irrigation water going forward means that these carbon depleted soils will not be able to retain as much rainfall supplied “Green Water” as they otherwise would have done.

Detrius food webs in conventional tillage farming systems
(adapted from Henrix et al 1986)



Bacteria Dominated Soil Systems

- Bacterially dominated soil systems are created due to the destruction/depletion of normal soil carbon levels.

The Issues with Conventional Tillage (1)

- Constant tillage of the soil causes the destruction of the natural Carbon Macroaggregates by a process of abrasion.
- As the Macroaggregates are abraded they lose their carbon based cover and their ability to hold water and nutrients is destroyed
- Abrasion of Macroaggregates results in CO2 and nitrogen emissions from the soil.

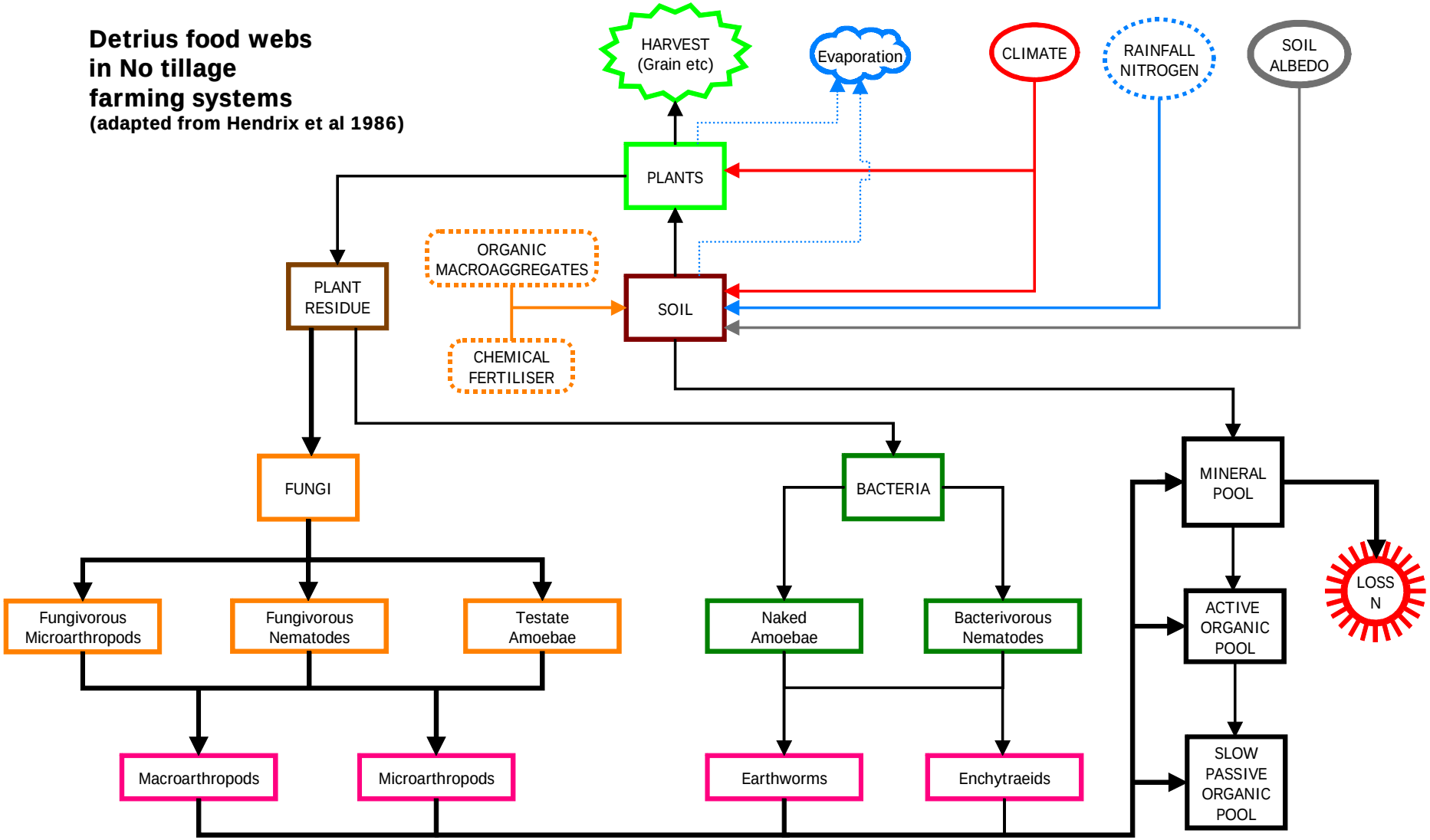
The Issues with Conventional Tillage (2)

- The gradual destruction of Macroaggregates means that the soil becomes a bacterially dominated ecosystem.
- Bacterially dominated ecosystems do not have a good ability to provide soil nutrients in a form that can be best utilised by plants.

The Move to Low or No Tillage

- Low or No Tillage Farming Systems gradually convert to Fungal dominated ecosystems which in turns allows the creation over long periods of time of natural soil Macroaggregates.

Detrius food webs in No tillage farming systems
(adapted from Hendrix et al 1986)



Soil Carbon

Soil Carbon Levels and Wheat Yields

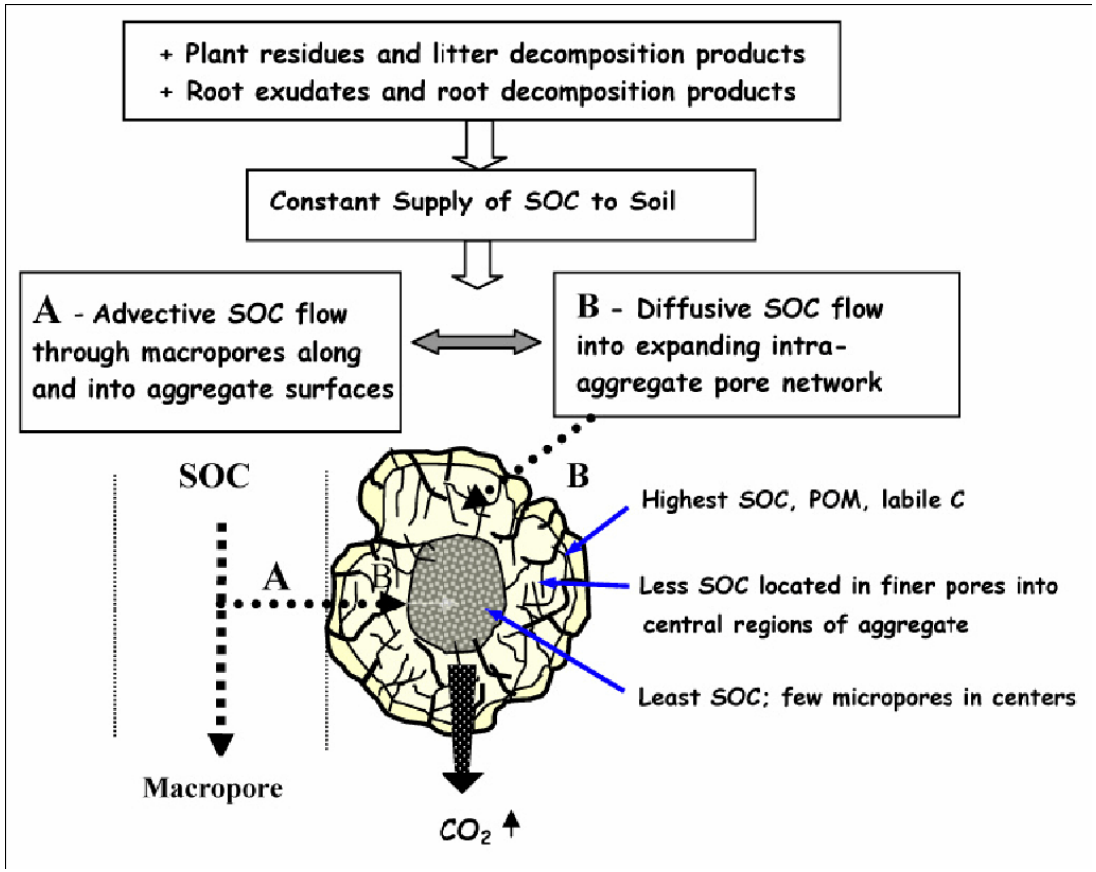
Ideal Dryland Winter Wheat Soil Carbon level is a minimum of 1.5% with an ideal level ~3.5%

Over the last 27 years this level has, on average, declined by nearly 50%

New cultivars and changed tillage practices increased yields for some time but are now in serious decline

The Natural Macroaggregate

Source – A.J.M Smucker Et Al, Soil Science Society of America Vadose Zone Journal Volume 6 pages 282 – 290- May 2007



A Partial Solution

- Application of high carbon content Macroaggregate Fertiliser will assist in unlocking some of this stored nutrient and retaining Nitrogen currently lost to atmosphere or waterways thus helping to restore soil microbial communities

The Farm in 2018

- Carbon Rich engineered Soil + Control Track dryland cropping
- Farm fuel produced on Farm
- Chemical Fertiliser at less than 50% of the nutrient requirement

The Farm in 2018

- Only the best soils farmed but very intensively
- 35%+ of average farm turned over to dryland forestry
- Ungulate sensitive native grasses grown in the spaces between the engineered soils in the control track system
- Rapid adoption of on farm mini - feedlots

Demand

- Major global shortage of organic grains is driving premium prices for these products
- Global water shortages will necessitate a move towards higher levels of dryland production – this will in turn drive a move to carbon rich fertilisers
- Emission taxes on chemical fertilisers will flow through to product pricing

Marketing Impediments

- Australia currently has the lowest fertiliser application rate per ha.
- Rural fertiliser distributors will only handle products that are supplied by their existing (contracted) manufacturers.
- Current organic fertilisers cannot be bulk handled as they are not “ruggedised”.
- There is currently no carbon based fertiliser that can be bulk handled and co-blended with chemical fertilisers

What is CFF Delivering

- A 200,000 tonne per year Carbon Macroaggregate plant at Leeton in NSW
- Operational March – April 2009, Base product at ~$250 per tonne ex works
- Further plants identified at Griffith (NSW), Melbourne (500Kt), NSW Central Coast, Qld Central Coast, smaller facilities in Northern Tasmania, Adelaide, Perth, North Coast NSW and New Zealand

The Plant

- First of its type to be constructed outside the USA and only the fifth plant of its type

- State of the art process control and 50 years of experience mean that for the first time a ruggedised granulated product suitable for conventional seeding equipment can be made out of organic waste or a mixture of organic wastes and chemical fertiliser.

Take Home Message

- The Chemical fertiliser sector is a major potential source of risk for the farming sector and the Australian environment over the next ten years.

- Climate Change and Climate Variability issues will drive a significant move away from the current chemical fertiliser model.

In 10 Years Time

- The Dominant Fertiliser Model in Australia in 2018 will be very different to the model that is currently dominating the farming sector.

- Will the current industries players be astute enough to move with the change?

Cutting Down

- The importation of Potash fertiliser could be totally replaced.

- Phosphate fertiliser consumption could be reduced by 50-60% and that which is sold could be co-blended with carbon based products

Cutting Down

- Nitrogen based products may be seriously impacted by fuel costs and carbon taxes and will probably be moved into carbon co-blended products

The End