

CASE STUDY 2: Phosphorous A Finite Resource to be used Wisely

It is well recognised that phosphate is an essential requirement for plants, in particular for those non-indigenous to Australia, which have been introduced in the past 200 years for Agricultural purposes and which, quite miraculously, acclimatized and ecologised, together with introduced animals, into the Australian environment.

In 1952 an eighty year old Jersey breeder friend, who arrived in Australia with his father in the 1880'ies and developed a South Gippsland dairy farm, reported as follows:

Native pastures were replaced with more productive English clovers and grasses which, initially, grew prolifically, but from approximately 1910 onwards, slowly began to wane. No fertilisers whatsoever had been applied. By 1920 few of the imported species remained. On application of superphosphate especially the clovers returned in great abundance to the relief of farmers, even if associated with such problems as bloat. After some further years, despite increased applications of superphosphate, imported species again weakened. Applications of potash improved the situation temporarily, followed by a similar scenario with nitrogen.

Quite obviously the original Gippsland soil supply conditions – maybe better than the Australian average – could, for the first decades, maintain improved pasture species. Whereas, the original native species, inclusive of some legumes, had maintained status quo – since whenever – under indigenous grazing pressure.

My friend Alan Morgan, Senior Irrigation Officer of the Victorian Agriculture Department after World War II, informed me:

1. that of the considerable quantities of superphosphate applied to the State Research Farm at Werribee, at that time, over 90% was locked up through acid action. Whereas it was unknown how much of the remaining 10% actually did reach plants and what proportion may have drained away.
2. when, after WWI Alan was irrigation Officer in the Kerang-Swan Hill district, during the establishment of Soldier Settler irrigation blocks – and only delivery but, as yet, no drainage channels, existed – “the more super and water we put on, the bigger the plants grew”: until, almost overnight, the Cohuna Salt disaster occurred. (The first real such - long before emergence of Western Australian salt problems.)

Alan, an objective scientist, blamed himself for Cohuna, “we just knew no better.” He retired early and looked after some land.

“We knew no better”. We still do not know how much, or how little phosphate is required to maintain a sustainable economic production.

“The more super, the more growth” has brainwashed not only the farmers, it has been the main “advisory” base of scientists (with later inclusion of Potassium, Nitrogen and trace elements), and, the resulting plant pest and fungal chemical “requirements”, ditto for animals¹.

Doug Small’s 1991-4 (when Senior Soil Researcher of Victorian Agriculture Department at Kyabram) exhaustive tests, comparing 10 bio-dynamic dairy farms to 10 near identical conventional neighboring farms – originally – showed results such as:

A: Bio-dynamic farms for average of 16 years had no Phosphate or any other fertiliser, no chemical, no drench input.

B: conventional farms had all inputs in abundance.

He states: “Few differences were found in 130 different soil, plant, animal and milk measurements”, undertaken annually per farm.

Bio-Dynamic	Conventional
Over 40, of each, soil, plant and carcass tests NEVER showed a “deficiency” of any major or minor elements.	Showed surpluses of some elements, especially Phosphate, - presented as “desirable”.
Indications of no NPK “run off” (though insufficiently researched)	Indications of the usual high amounts of NPK and chemical “run off”
1 X Irrigation	2½ X’s Irrigations
Even without drenching virtually no liver fluke, even at age	Usual great amounts of drenching from early age and still some liver fluke damage.
High number of lactations per cow, insufficiently researched. Major cost factor as “two lactations” income required to raise a milker.	Average number of lactations much lower.
Gross income (very poorly researched) approximately 15% less.	Compared to conventional taken as 100%.
Very low salt levels.	Salt at critical level for clover growth.

¹ Podolinsky: BioDynamic Agriculture Introductory Lectures Volume 1, Lecture 1 and 2.

“Reported” loss of phosphate via milk and carcasses leaving the farm was “mathematically calculated” for Bio-Dynamic farms irregardless of no deficiency of Phosphate in all t e s t s (!).

Bio-Dynamic cattle fed little grain.

Conventional used much grain.

Artificially fertilised (nitrates) pastures² and grain causes lowering of pH in rumen, resulting in bloat, undesirable “cell counts”, acetonaemia, sterility and other symptoms of ill health. Additional to this, John McDonald, Victorian Agriculture Department Veterinarian - who undertook the associated carcass examinations - attributed much lower rate of sterility of Bio-Dynamic cattle to the “inexplicable” increase of selenium (nearly double) compared to conventional cows.

We accept Doug Small as an honourable and capable researcher of “figures” of test results. To my assistant, Frances Porter (B.Ru.Sc. Hon. I), and myself he said, “the 130 research result figures of Bio-Dynamic and conventional farms are almost the same, there is very little difference” (with selenium and salt major exceptions). The cardinal difference being that the Bio-Dynamic results were obtained W I T H O U T:

- using fertilisers or chemicals;
- NPK run off, contributing to blue-green algae problems;
- Irrigating only once compared to 2½ times;

The Western World is overloaded with dairy products. How much more sensible not to over tax cow production causing health and other problems, ie. to avoid the hysteria of excessive production as “ideal”.

At the October 2003 OFA conference in Adelaide a 30% “oversupply” of phosphate was still reported as “ideal” – compared to the unforced and naturally offered milk production of the Bio-Dynamic test herds.

The Victorian Agriculture Department, as reported to Frances Porter and myself, did not permit Doug Small to publish a complete report of his test results.

Costs, gross income and the more essential N e t income were very poorly assessed:

- Environmental costs caused by NPK and chemical run-off insufficiently assessed and calculated. Examples available from cotton farms, rice farms, Barrier Reef.
- Costs caused by algae bloom;
- Amount of expensive irrigation water used not assessed with Bio-Dynamic farms irrigating less often;
- Costs in labour of each additional irrigation not assessed;
- Environmental costs to river systems through extra water usage;
- Assessment of unnecessary drain on Phosphate recourses;

² Podolinsky: Bio-Dynamic Agriculture Introductory Lectures - Volume 1, page 30; Bio-Dynamic Agriculture Introductory Lectures - Volume 3; and Bio-Dynamics Agriculture of the Future.

- High levels of non-solar energy usage in the production of, especially, Nitrogen fertilisers;
- Damage to soils through compaction and long lasting chemical residues;
- Questionable chemicals entering food supply and resulting health concerns (with consideration that for many chemicals there is no testing method available, ie. no detection);
- Establishment of biologically active soils on Bio-Dynamic farms with production attracting premium prices; Humus levels and soil structure not addressed.

Rock Phosphate is acid soluble. Certified organic or bio-dynamic farms are not permitted to use “artificial” fertilisers. This causes a major problem to certified farms on alkaline (Mallee) soils. A conventional suggestion is to add sulphur to the Rock Phosphate. Depending on organic matter levels and moisture retention this is more or less effective. The experience on Bio-Dynamic farms is, that the “organic matter” level is not the deciding factor, the HUMUS level is. Conventional Agriculture is not conversant with humus.

Figures from a Bio-Dynamic – originally white sand – Mallee farm are:

- Organic matter level in 1985 was equal to the district level of 0.5%. After two years under biodynamics, this had risen to 2.1%. Approximate consistency since has been 2.8 to 3% with a considerable increase in HUMUS COLLOIDS **aiding water retention**. The farm crops approximately one in three years.
- Crops are amongst the best in quality and yields. Voluntary summer “weeds” as green manure offer an essential supply of recycled or new NPK. Wild melons have in spots even created a too high level of Nitrogen.
- Under such conditions an addition of 2 to 3 Kg of Phosphorous (P) per hectare has proven a sustainable input level.
- With drought caused lack of green manure 2Kg of P as “composted” chicken manure and chicken bodies (P & N) suffices, but green manure brings best results.
- On conventional district farms 18 to 22 Kg of P is used with each crop.

I used no Phosphate on my own farm for 40 years.

The world reserves of economically accessible Phosphate, at the current rate of usage, have been quoted at 80 to 200 years, with economically accessible P forshadowed at approximately 25 years.

How will conventional and “organic” farms in Australia’s low Phosphate environment manage without Phosphate? Is it not time to reverse the Phosphate policy in very many facets such as :

- Stop the hysterical oversupply of Phosphate mentality as “keeping up the Soil fertility”
- Recycling of Phosphate in well structured (air, drainage, humus) biologically active soils without murderous effects of chemicals and oversupply of NPK,

laming soil biology which has been rendered unnecessary in virtual hydroponic situations³;

- Research – under such biological conditions – of Phosphate recycling potential;
- Even “inexplicable” INCREASES in P have been recorded;
- Research and condemnation of NPK and chemical “run-off” via varying agricultural methods, causing environmental damage, such as dead trees, saltation etc.⁴;
- Revise agricultural education at Universities;

Huge amounts of Phosphate have been wasted and have damaged the environment. We have wasted the assets of future generations.

³ Podolinsky: Bio-Dynamic Agriculture Introductory Lectures Volume 1- Lecture 1, and Bio-Dynamics Agriculture of the Future.

⁴ Podolinsky: Bio-Dynamic Agriculture Introductory Lectures Volume 3 – Lecture 3, and Living Agriculture.