

Biological Farming and Marketing

A report for



by Jonathan Shaw

2004 Nuffield Scholar

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Foreword

My objective was to gain a knowledge and understanding of the principles and practices of biological (non-toxic) farming and assess the viability of the concept.

My goal was to investigate the reasons for biological farming; to ascertain the feasibility of incorporating the principles into our current farming system - perhaps creating a hybrid farming system that is still highly efficient and economical, but less toxic to farm workers, the environment and the consumers of our produce.

The study broadened into the many benefits to animal and human health when produce and fodder is grown correctly, and the eating of less refined foods are eaten. I also wanted to explore a wide range of marketing systems and evaluate the profitability and workability of different models.

The main driver was to see if family farms could maintain an economically viable presence in the produce market place while still delivering quality of life to growers and their families.

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Executive Summary

My study topic was biological farming and marketing. I aimed to investigate non-toxic farming: the ideals, economics and practices involved. I wanted to find out how to grow highly nutritious produce that would benefit the health of farmers, consumers and the environment while being economically sustainable.

Whether it is grown Organically, Biologically or conventional, the nutrient density of the produce is most important for healthy food.

Sustainable farming is combining the “triple bottom line” philosophy of economical, environmental and social factors, into a whole farm system. It involves balancing ideals with profitability. Triple bottom line means not only evaluating the financial viability of your business, but also making sure your business activities are not adversely affecting other people or the environment.

Balance was the main theme that came out of my study. Balance in lifestyle/work, ideals/reality and inputs/outcomes. “Diversity is the key to success”; balance comes through diversity. The biological farming philosophy is “doing nothing that will harm the soil life”, which are the micro and macro organisms in the soil, ranging from earthworms down to fungi and bacteria. The philosophy of J I Rodale, the founder of the J I Rodale Institute, was “healthy soil, healthy food, healthy people”.

Principally the minerals in the soil have to be balanced, as the limiting factor is determined by the element that is in inadequate supply. Biological aspects then need to be considered: adding good humified compost is a good way of getting organic matter and microbes into the soil. Soil must then be fed and microbes in the soil enhanced. Molasses, fish and kelp are good food sources for microbes. There is also a need to reduce the amount of chemical and acid treated fertilisers or buffer them with a carbon source, eg. Humic acid, molasses, fish or kelp.

If the conductivity of the soil solution is raised too high by any fertiliser added, it can kill soil life and can even burn root hairs. In a well-managed soil the humus levels should rise every year or at least be maintained. Over cultivating to break trash down, burns up the organic matter, rather than letting the microbes convert it to humus.

The beneficial microbes in the soil have to be in adequate numbers to balance out the effects of any pathogens in the soil. They also help in creating air pockets in the soil, which helps give the soil what is known as ‘structure’. Plant roots cannot survive without oxygen. Aerobic microbes from a good compost source are beneficial.

Most pathogens are anaerobic, so it is of paramount importance to have an aerated root zone and to manage moisture levels in an irrigated situation as water logging deoxygenates water.

Different methods of marketing were looked at: from large scale wholesaling with 365 day supply to supermarkets, down to retailing from the farm gate as well as supplying restaurants etc. The profit margin in direct retailing was obviously a lot higher than wholesaling although supplying large volumes wasn't an option. This kind of marketing relies on having a close large population, or developing a very good distribution system, which relies on strong alliances down the supply chain.

In the eastern USA direct marketing was very successful, as the population density is high. Farmers' Markets are a common event, personalising the producer to the consumer and giving consumers the confidence (or perception) that they are getting a fresher, cleaner and more nutritious product.

One thing that came up in my study was the health benefits of eating non-processed, naturally grown foods, not so much organically grown, but grown to produce fruit and vegetables or fodder animals are fed that is minerally dense. Not by just using NPK fertilisers but a whole range of minerals, vitamins and enzymes. Calcium, for example, is considered by biological farmers to be the king of all nutrients and the building block to life.

Conclusions

Balance is everything. Farmers have to balance ideals and realism. To change to fully biological systems too fast will almost certainly bring economic hardship. Adopting IPM (integrated pest management) strategies is an excellent first step in the process of working to build up soil health by balancing minerals and encouraging biology every year. Building up OCL (Organic Carbon Levels) will help raise the nutrition levels of our produce, which will in turn be a huge benefit to public health.

After all, "healthy soils, healthy foods, healthy people" must provide sustainable economically healthy returns to producers for this to become reality!

The major problem is that the general public (consumer) doesn't put a value on the nutrition of food; price is the major concern. Even those who want clean, green produce still wish to pay the cheapest possible price.

If farmers are to be expected to produce cleaner, greener nutritionally dense foods then they must be reimbursed/rewarded for their efforts, rather than being regulated and penalised for not doing so. We need incentive based food safety/quality programmes not “the big stick” penalty approach.

The supermarket mentality of buying food cheaply from the producers and keeping the lion’s share of the profits will ensure that the functionality and health benefits of our produce remain low. Farmers competing on a global market, to remain viable, are compelled to achieve higher yields with minimal costs (as the \$ margins are very slim) while ensuring the product is aesthetically pleasing. The environmental impacts of operation and the nutrition levels of produce are not something that are generally recognised in financial returns. Farmers are being squeezed and regulated by governments to have a triple bottom line, but for the best environmental and health benefit outcomes, government pressure would be better applied to the retail end of the supply chain to return a higher percentage of profits to the farm gate. Then farming enterprises will be in a better financial position to address environmental and social health/ well being issues, both in their farming practices and in the end product.



Turning compost in Illinois USA

Introduction

Biological Farming

Diversity is the key to success.

Balance through diversity.

There are many terms used today to mean something roughly the same as biological, eg. sustainable, natural, alternative, etc.

Biological farming simply means farming with fewer chemicals, looking after the soil better and in a cleaner environment. The system should be capable of being used indefinitely, enhance soil and the environment, and generate viable economic returns without compromising human health.

In summary the concept is: to do nothing that harms the soil life in any way; to use the principles of nature to grow by; to be self-sustaining; to enhance air, water and soil quality while consciously trying to reduce the consumption of energy and depletion of non-renewable energy resources; yet still maintain viable economic returns for the producer whether it be in crops or livestock.

The balanced nutrient density of the produce is paramount for the functionality of the produce, whether totally organic or semi conventional (biological) or conventional, farming practices are used.

Marketing

I also looked at marketing systems and techniques in Spain, USA, UK and Israel.

- 365 day wholesale supply – Way Bright Dairy, USA
Health Fresh Foods, UK
Intercrop, Spain/UK
- Wholesale volume niche marketing – Negev, Israel
- Farm retail with many different scenarios in US, Scotland and England.

The Study

Soil Management

- Mineral
- Biological
- Physical

Whether growing livestock, fodder, or fruit and vegetables, our living is coming from the soil, therefore it is of vital importance to have it performing at its peak for broad grazing such as in the Northern Territory.

Mineral

The mineral balance of a soil needs to be addressed before anything else. A soil test is an essential tool and two that were used by the farmers I visited, were the Albrecht and Reams methods. Many believe the Albrecht test, (although an excellent analysis of total nutrient value) doesn't indicate whether those nutrients are plant available, or not, where-as the Reams method gives a more 'plant available' result, but doesn't give any indication of the total amount. The Albrecht Method apparently uses a higher acid solution to dissolve the minerals. The Reams testing method, on the other hand, uses only a mild acid, which is said to mimic that of a plant's roots to dissolve minerals, so is better suited to determining which nutrients are available to a plant.

Most people I saw recommended using both tests, so as to know the nutrients that are available to the plant now, and also those nutrients that may become available over time.

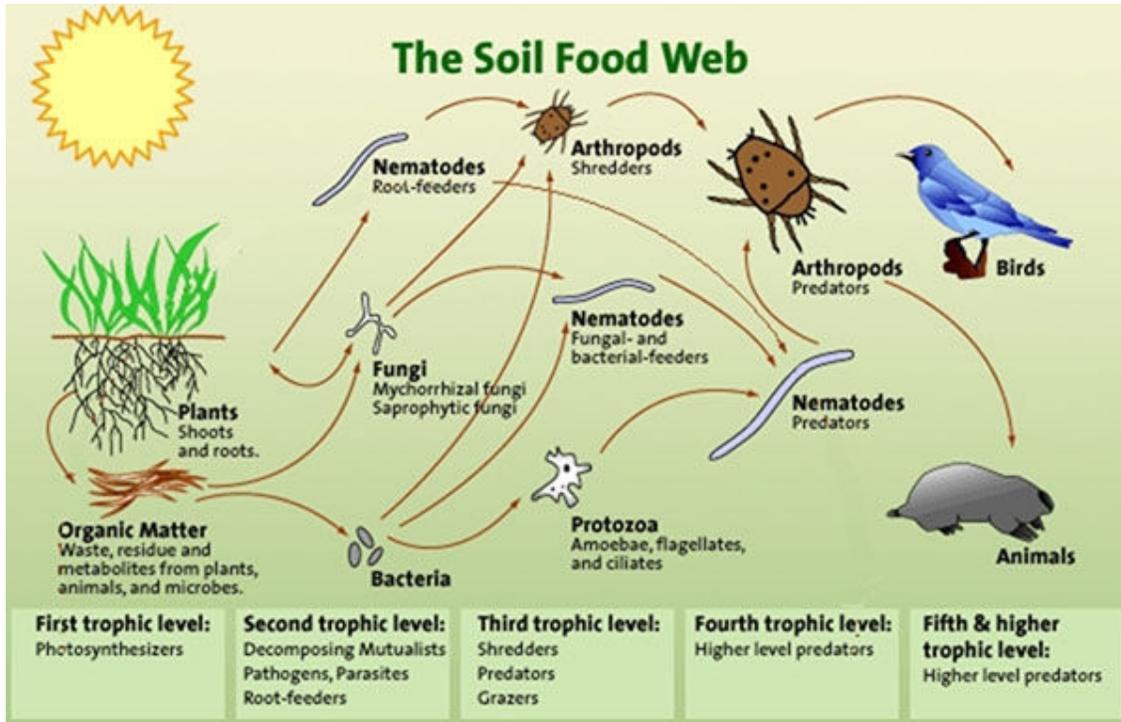
Biological farming addresses calcium deficiency first as calcium is seen as the "king of all nutrients" with phosphorus being the "queen".

All minerals must be in adequate supply; if one element is absent or unavailable it will limit the yield of the crop or could adversely affect the quality of the produce.

The biological approach doesn't just address NPK needs. It strives to have a whole range of minerals present for the plant to access, not just the twelve elements that conventional agriculture recommends as essential in N, P, K, Ca, S, Mg, Zn, Mn, Fe, Cu, Bo and Mo.

The biological approach isn't so concerned with pH or achieving exact numbers of total nutrients in a soil test, but is more focused on having adequate nutrition to grow the crop and sustain soil life. (Available calcium and nutrients are the main concern, not 'getting a pretty soil test' *Gary Zimmer.*)

Action – take soil test. Test different paddock and soil types. The key is to use a soil laboratory that is not affiliated with any fertiliser company; one that will offer good unbiased recommendations that test for total nutrients as well as available nutrients. Then you will know exactly what you are working with and the right amount of which element to add.



(Diagram thanks to Soil Foodweb Institute, Lismore.)

Biological

This is the living element of the soil i.e. its macro and micro-organisms eg. Earthworms, bacteria, fungi, amoebae, protozoa, nematodes, etc.

These also have to be kept in balance and in sufficient numbers for proper soil and plant health. Soil microbes should be considered and treated the same as livestock, and their food, water, oxygen and comfort needs assessed and met.

The biological components of the soil are responsible for: digesting residues from previous crops and cover crops and turning it into humus; making nutrients available for the next crop to be grown; and raising the CEC (Cation Exchange Capacity). The CEC is the amount of positively charged ions a soil can hold. The cations are: calcium, magnesium, potassium, sodium and hydrogen. Properly digested crop residues will also raise the water holding capacity by raising the organic carbon levels i.e. humus.

There are specific species of nitrogen fixing bacteria that can be either added straight to the soil or better still put through the composting process and then added to the paddock to supply a percentage of the crops' nitrogen needs.

Mycorrhizal Fungi exude a sticky substance called Glomalin, which glues soil particles together to give the soil 'structure'. It also has the ability to attach to root hairs and bring nutrients from outside the root zone back to the root where an exchange takes place between the plant root and the fungus. (Plant root exudates for nutrients.)

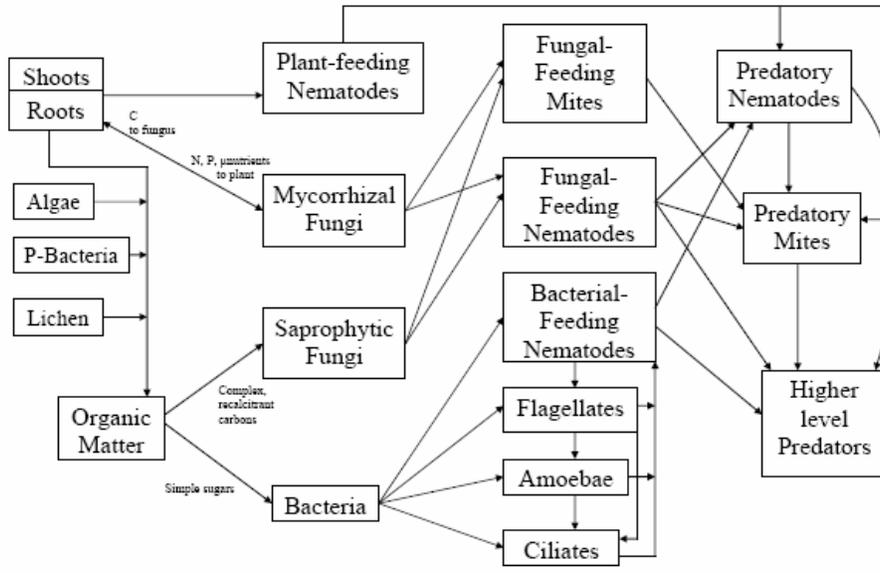
Some microbes burrow through the soil and make areas to live in, leaving pathways in the soil that aerate the root zone. The most obvious are Earthworms but other main species are protozoa (flagellates, amoebae and ciliates) and Nematodes, of which there are many different species, some beneficial to crops and some destructive.

The SFI (Soil Foodweb Institute), founded by Dr. Elaine Ingham, performs detailed soil biomass analysis, and offers advice to help growers manage their soil organisms. (*See attachment on page 12.*)

Action:

- Use only high quality fertilisers and more bio-friendly ones with a low acid content as acid fertilisers can kill the microbial life in the soil.
- Apply a carbon source with every fertiliser application to buffer the burning effect of the fertiliser and to provide a nutrition source for microbes. Carbon sources that can be used are: Humic Acid (dissolved leonardite coal) either as a solution or granules (depending on how the fertiliser is applied eg. fertigated or broadcasted); liquid fish (whole pressed/ground-up fish, as a liquid solution); molasses (mixed with soluble fertilisers) and kelp. Soluble and composted kelp products are available commercially and have the added benefit of being an excellent source of minor and micro trace elements.
- Add good quality compost to get a broader range of beneficial microbes in the soil.
- Use a bio soil test once a year to assess species numbers and to ascertain aerobe/anaerobe ratios (the Soil Foodweb Institute in Lismore do such a test) and receive advice on the future management.
- Don't over cultivate to incorporate organic matter, as this destroys soil structure and can cause residues to oxidise and 'burn up' before microbes have digested them thereby risking the loss of valuable nutrient supplies.

In Israel organically grown crops in the Negev are band composted at 200m³/ha for nutrition, biology and moisture retention.



The Soil Foodweb – by Soil Foodweb.™ Inst.

1st page of a SFI report.

		Soil Foodweb Institute Pty Ltd 1 Crawford Road, East Lismore, NSW 2480 Australia Phone: 0266225150 Fax: 0266225170 e-mail: soilfoodwebinst@aol.com					Soil Foodweb Analysis Name Company Address					
		Plants: Sample Received: 20/04/2005 Invoice Number:					Report Sent: 12/05/2005					
Organism Biomass Data												
Sample #	Unique ID	Dry Weight of 1 gram Fresh Material	Active Bacterial Biomass (µg/g)	Total Bacterial Biomass (µg/g)	Active Fungal Biomass (µg/g)	Total Fungal Biomass (µg/g)	Hyphal Diameter (µm)	Protozoa Numbers/g			Total Nematode Numbers #/g	Percent Mycorrhizal Colonization of Root
aaaa	west end	0.68	42.8	204	14.7	314	3.0	67,475	8,429	842	0.23	0%
Bold Means Low		In desired range.	Excellent.	In desired range.	Low active fungal biomass.	Low, need to build fungal diversity.	Community of disease-suppressive fungi present.	Good protozoan numbers. Nutrients are being cycled and made available to plants.			Low numbers, low diversity. Need to add beneficial nematodes.	No mycorrhizal colonization. Need to add an inoculum of mycorrhizal spores, then provide humic acids to feed mycorrhizal fungi and improve colonization.
Desired Range		0.45 - 0.85	5 - 15	100 - 300	25 - 50	600 - 3000	(A)	5000 +	5000 +	25 - 50	50 - 75	40% - 80%
(A) Hyphal diameter of 2.0 indicates mostly actinobacteria hyphae, 2.5 indicates community is mainly ascomycete, typical soil fungi for grasslands, diameters of 3.0 or higher indicate community is dominated by highly beneficial fungi, a Basidiomycete community. Season, moisture, soil and organic matter must be considered in determining optimal foodweb structure. If sample information, such as pesticide, fertilizer, tillage, irrigation are not included on the submission form, sender's locale is used. One report is sent to the mailing address on the submission form.												

By permission: Soil Foodweb Institute. Lismore. NSW

Physical

The physical aspect of the soil can be influenced by the mineral content, (eg. Ca flocculates, Mg tightens) and also by the biological content. Soil that has structure will hold together and keep air pockets so it doesn't become deoxygenated.

Soil Management tools:

- Soil test and recommendations
- Penetrometer-device to push into the ground to determine tightness
- PH meter 1:1 Soil with water 6.4 to 7 pH is optimum
- Conductivity meter-for monitoring soil conductivity(Soil EC should range between 200 at planting & gradually increase to around 600 at fruiting) source: Graeme Sait – Nutri-tech solutions
- Deep ripping is useful for aerating soil although if the soil is out of balance it will revert quite quickly back to its original condition due to the magnetic attraction of cations and anions.(Dr. Skow)

Water management is crucial to production in the Negev Desert, Israel.

These capsicums yield up to 80 tonnes to the hectare.



Water Management

Under a bio-system, crops have the ability to withstand drought for a bit longer as the soil is more open and roots can penetrate deeper; while the humus levels are usually higher, which enables the soil to hold more moisture.

In Fairmount Minnesota I spoke with Dr. Dan Skow who runs an agricultural consulting company called International Ag Labs Inc. He claimed he had seen soy crops in a well managed biological farming system, still looking good after 50 days without rain while the neighbouring paddocks, which were grown without focusing on soil biology, had shut down due to the droughting, and suffered a far greater yield reduction at harvest.

In an irrigated system using some kind of monitoring tools for irrigation scheduling and durations is essential even if it's only a shovel or hand auger.

Over irrigating leaches nutrients out of the root zone, eventually adding to the environmental damage to rivers, lakes and wetlands (blue-green algae being one example) and causing yield losses due to nutrient deficiencies. It can also cause root disease, by creating an anaerobic environment in the root zone, in which pathogens become prolific. Over irrigating also adds extra costs in water delivery and fertilisers, as well as wasting the valuable resource of water.

Irrigation Management Tools:

- Daily evaporation readings
- Tensiometers
- Gypsum blocks
- Data logging gypsum blocks
- Capacitance probes

Crop Management

The nutrition side of crop management meshes with the soil management approach, enabling the plant to grow steadily with all elements of nutrition in adequate supply. Too much soluble fertiliser can not only damage soil life but can raise the soil solution conductivity to a level which can burn root hairs and eventually burn or even kill the crop. (The conductivity meter is a useful tool for monitoring the conductivity of the soil solution)

Taking at least two leaf samples through the life of the crop is also considered a must. One at flowering (or just prior) and one at fruit fill to make sure nutrition is adequate. Foliar nutrition supplements are a very quick and efficient way of getting trace elements into the crop and the right mix can be determined from the leaf sap sample.

Many biological farmers believe cultivation to be the only safe, effective way of controlling weeds and use machines such as rotary hoes and ridge tilling equipment. They also use flame burners just prior to crop emergence to burn off weed seedlings that have already germinated. Timing is crucial in using such methods, but I saw the evidence of some very effective controls.

Some farmers use lower herbicide rates & always include a carbon source (eg. Kelp, Fulvic acid, molasses) to buffer the shock to the crop, and provide a food source for microbes.

Another school of thought involved using Glyphosate at very weak rate (at about 25% of recommended rate) prior to planting to kill the crop, then using a crimping roller to lay the mulch crop down, just before seeding into it with zero till seeders.

The down side of non-toxic weed control is it uses a lot more fuel, takes more time and needs cultivating machines to be built exactly the same width and configuration as the seeders. The upside is that it isn't poisoning soil flora and fauna or leaving chemical residue that can potentially damage the next crop.

Klass Martins in New York State believes some herbicides make the weeds proliferate the following season after they have been used because they have an antibiotic effect that kills soil life when you plough the crop residue in. One example he gave was Lambs Quarter (or Fat Hen as we know it) doesn't like mycorrhizal fungi, so it is greatly reduced where there are good mycorrhiza levels. He believes one particular herbicide reverses that and kills mycorrhizal fungi which leaves a soil conducive to Fat Hen, (which is suppressed by mycorrhizal fungi.) This is obviously his own opinion-based on his own personal experience and research, whether this is true or not is something that would have to be learned by personal experience, but Klass is a very good producer and his yields are slightly better than conventional yields in an average year. In a dry year his yields are higher than his neighbours because of the moisture retaining attributes of humus. In a wet year he suffers a bit because of the same thing - humus holding too much moisture.

This just emphasizes the fact that constant biology analysis might be a good idea, to help fully understand what is happening in the soil.

Crop Management Tools

- Refractometer: the most commonly used tool whether growing food or fodder. It measures the brix levels of the sap, which are the soluble solids (sugars). The higher the reading the higher the nutrition levels in the food or feed. An ideal reading is one of 12% or higher with a fuzzy line not a crisp straight line.

One example of the benefits of high nutrient density was in Nebraska. Del Akerlund grows organic corn with consistently high brix readings. He has a neighbour who fattens hogs and feeding them conventionally grown corn he was getting a 3.5 - 4:1 conversion ratio. On Del's corn he achieved 2:1 conversion rate, 12 bushels per hog down to 7½ bushels per hog. It doesn't prove organic necessarily better but higher nutrient density of the produce is better for the conversion of the corn to weight gain.

- PH Meter: used for testing sap pH. The ideal level is 6.4 pH. If the level is too low (acid) the crop will be more susceptible to fungal attacks and is probably short of a cation (positively charged ion) eg. Ca. Mg. K. If the pH level is high (alkaline) the crop will become more susceptible to insect attacks and is probably short of an anion (negatively charged ion) most probably phosphate, nitrate or sulphur.

Also good for checking the foliar spray water of the spray tank - slightly acid is better for most spraying situations and applications.

- Conductivity meter: measures the electrical conductivity of sap and soil solution as well as foliar spray solutions. Sap should be kept in the range of 2000 to 5000 uS. (*Dr. Arden Anderson*) Foliar sprays at around 1200uS to 2000uS (over 2000uS can cause burning.)
G. Sait : Nutri-tech Solutions.

Pest Management

The best pest management system starts by having the plant in balance nutritionally with a high brix level. The pH should be at around 6.4.

Balance minimises pest / disease occurrences. I talked with Doug Murray on the 19/8/05 who has a Masters degree in Entomology and now works with biological controls in a range of crops. Some of the products he spoke about were:

- Neem Oil for aphid control, he claims it kills up to 90% of aphids
- Karanja Oil for Insect control (mixed with Neem Oil)
- Pyrethrum for broad spectrum insecticide
- Mint for deterring mosquitos
- African Marigolds ploughed in for nematode control
- Aromatic oils (cedar oil etc) for disrupting insects' signalling system
- Apple cider vinegar for fruit set at flowering (5 litres in 100l/Ha)

Compost tea is another form of disease control – instead of working as a fungicide it has a probiotic effect. It is produced by breeding aerobic microbes from a good quality compost in an aerated tank, feeding them with molasses, fish, kelp, humic acids and plant saps like dandelion and Aloe Vera, brewing them for 18 to 36 hours then spraying the mixture onto the foliage, or fertigated or sprayed into the root zone. The beneficial microbes need to colonise the leaf or roots surfaces to out number and overcome the pathogens. Everyone that talked of these sorts of controls stressed that the Sap pH level played a big part in successful control.

Nutrition and Health

Healthy Soil, Healthy Food, Healthy People

Throughout the trip many people talked about food and fodder, how it's grown and the effects on animal and human health.

Sources: Paul Stitt, Jerry Brunetti, Sally Fallon (Weston A. Price Foundation), Rodale Institute.

The theory that milk is milk and an egg is an egg came under fire a lot on my trip, with many people stating similar things to Joe from Organic Valley Co-Op in Wisconsin, "It's not common sense to say it doesn't matter how a plant or animal is fed or treated, that it's all the same." It raises the question; do inputs have a bearing on outcomes?

One of the main things that came out was animals must be grass fed, or at least receive 25% of their dietary needs from pasture.

Cattle and sheep can only get CLA (Conjugated Linoleic Acids) from pasture, which in turn they store in their fat, and is a powerful cancer preventing amino acid in humans. It is greatly reduced to non-existent in grain fed animals.

Grain fed animals have a higher monounsaturated fat content. (Source: Weston A Price Foundation www.westonaprice.org)

Vitamin A only occurs in grass eating animals, not in fruit and vegetables. They only have beta-carotene that animals convert in their digestive systems to vitamin A, which is then stored in their organs and fat.

Humans cannot convert beta-carotene to vitamin A without the fat dissolving vitamins and enzymes that come from consuming animal fats that have been fed on grass pastures. (Vegetarians, therefore, have a real need to supplement vitamin A in their diets.)

Vitamin A is needed for:

- Protein assimilation
- Calcium assimilation (both protein and calcium are needed for proper growth)
- Prevention of birth defects
- Proper function of glands
- Proper thyroid function
- Immune system function
- Production of stress and sex hormones
- Eyes, skin and bones

Vitamin D is the other main vitamin, which the WAP foundation believes is very deficient in a western diet today. It is created by the sun on our skin and uses cholesterol to assimilate it into our bodies. If you are working inside an office you should have full spectrum fluorescent lights which will help to overcome vitamin D deficiency.

Vitamin A and D sources are liver and organ meats, fish, fish eggs, shellfish, insects, cod liver oil, eggs, butter, cream, bird fats and animal fats.

The WAP Foundation believes we must eat fats and that saturated animal fats are vitally important to maintaining health. They claim 70% of cholesterol is formed from polyunsaturated fats coming from vegetable oils (canola, palm oil, cottonseed oil, sunflower oil etc). They believe coconut oil to be the best with olive oil (pure virgin olive oil) next.

Paul Stitt, Jerry Brunetti and Sally Fallon believe a healthy diet avoids the extremes of proteins, vegetables, dairy and carbohydrates, but needs many varieties of fish, raw milk products, vegetables, meats and unprocessed grains. The human body cannot utilise minerals like phosphorus and calcium without the presence of other substances, particularly fat-soluble vitamins and enzymes.

Jerry Brunetti stated that vitamin D is actually a hormone and is present in every cell and the body cannot metabolise calcium without it. He also says, “Balance doesn’t come from having one foot in hot coals and one in a bucket of ice.” Protein diets, vegetarian diets and carb diets, etc are all extremes and not the way to promote vibrant health.

Paul Stitt says, “Osteoporosis is a vitamin D deficiency not a calcium deficiency”, and they all believe that the major reason for heart disease, cancer and arthritis is actually a lack of nutrition, principally vitamins A, D, and E, not a lack of pharmaceutical drugs. They also recommend people reduce their intake of omega-6 and increase their omega-3 intake. Omega-6 is high in vegetable oils while cod liver oil is an excellent source of omega-3. Eggs from hens that are not grass fed are out of balance as regards the omega-6 omega-3 ratio. It is meant to be 1:1 but omega-6 can be much higher if the hens are fed incorrectly. The hens also need sunlight. So free range birds that are shedded and fed pellets allegedly do not produce a good quality food source.

Raw Milk: the subject is quite controversial and it is illegal to sell unpasteurised milk. However the WAP foundation believes it is really important to consume raw milk for vibrant health and they have many facts and sufficient evidence to back up their arguments. The USDA’s principal standard is for food to be “sanitary” and “unadulterated”. WAP claim

pasteurised milk is an adulterated product. They claim raw milk contains a whole list of bio-active cultures that can eliminate bad bacteria, some of them being: lactoperoxidase which seeks and destroys the bad bacteria, Lactoferrin; polysaccharides; enzymes; and anti bodies which give immunity for life; and polypeptides (medium chain fatty acids).

They believe raw milk is the, “safest food on the planet”. (Sally Fallon, 30/08/05)

They claim that pasteurisation either inactivates or reduces all the beneficial microbes in milk but leaves a few pathogens, so there is a void in which the pathogens can proliferate. They also claim that from feeding experiments on rats, the main thing noticed was the rats’ temperaments changed. They were calmer and more docile. Sally Fallon said parents have said the same of their children when fed raw milk. www.realmilk.com and www.westonaprice.org are some interesting web sites.

All the people I talked to claimed that huge amounts of minerals were lost in processed foods and that, as far as foods were concerned, the less refined the better.

The WAP foundation made some disturbing claims about soy, which can be viewed on their website www.westonaprice.org and follow the link ‘Soy Alert’.

Cayenne pepper is considered by Paul Stitt to be excellent for reducing pain of any kind and improving circulation, dissolving blood clots and clearing arteries and veins thereby reducing cholesterol, healing wounds and curing stomach ulcers. Stomach ulcers, he claims are caused by bacteria not acid food. It doesn’t react with other medicines and can be taken in capsule form if you don’t like chillies. I actually went off Warfarin on the trip and started taking cayenne and nattokinase tablets and had no DVT reoccurrence.

Key people that I visited:

Paul Stitt: A biochemist and co founder and owner of Natural Ovens Bakery. He has written a book, *The real cause of heart disease... is not cholesterol*. Paul and his wife Barbara have introduced a healthy foods programme into schools and have seen the children's behaviour change dramatically and believe good foods, good hydration and exercise is the right formula.

Jerry Brunetti: Agronomist and animal nutritionist, was diagnosed with Hodgkin's Lymphoma six years ago and was given six months to live. He refused the conventional treatments and cured himself through diet and lifestyle. Jerry does a lot of public speaking and has a DVD available entitled, *Cancer, nutrition and healing, a personal odyssey*.

Sally Fallon: President of the Weston A Price Foundation and author of the book *Nourishing Traditions*. The WAP Foundation was set up by Weston A Price, a dentist who travelled around the world looking at the co-relationship between diet and tooth decay. He then noticed a correlation with diet and health and wrote a book *Nutrition and Physical Degeneration*. The foundation now actively promotes the health benefits of wholesome dietary habits.

Dr Paul Hepperly at the Rodale Research Institute: is a research farm that has long-term experiments running with conventional and biological/organic farming methods. It also has a printing press where it publishes a lot of books on biological and organic farming and educational literature.

It was founded by J.I. Rodale, who lived in the city and had failing health, so he shifted to the country to grow healthy food, and through his printing press promote healthy living. Because he wasn't a scientist he received no credibility so he employed scientists to work his research farm. His philosophy was, "Healthy soil, healthy food, healthy people". They are now principally educators through the printing press but continue to trial new bio-control ideas and have replicated trials that have been going on since 1981, looking at corn, soybeans and winter wheat, organic/conventional. The yields are very similar, but the conventional plots have Nitrogen & chemicals leaching through the system. The organic system costs more in seed & fertiliser. But had a 40% \$ premium at the time (they claim it needs a 7% \$ premium to be the same as conventional economically.) They have been recently asked by the United Nations to advise them on organic production worldwide.

There are many research articles on their web site www.newfarm.com follow the link: TRI RESEARCH, for research publications.

Marketing

The two main marketing systems from farms are wholesale and direct retail with many different variations in each system.

Wholesale



Wholesale was either supplying markets or retail supermarkets, with produce either seasonally or niche with some producers supplying 365 days and having farms in different growing regions to ensure supply.

This system relies on massive turnover for low margins and it is a lot easier to compromise on quality, as the focus is on tonnage and aesthetics rather than internal quality, flavour and nutrition. It is also risky if climatic conditions go against the producer in the growing season. As seen in Spain in the 2004/2005 winter where they had snow on the southern beaches and a bad run of consecutive frosts, big companies supplying the UK supermarkets had to buy fruit in from California at a huge cost to themselves, just to ensure their own market share for the next season.

Economics is obviously the governing bottom line, but supermarkets are now demanding environmental assurances from producers because it makes their consumers feel good, so there is a lot more paper work and recording required to stay in the market place.

For farmers in Europe the 'Assurance' only ensures they are able to sell their produce, it gives them no marketing edge, or price advantage.

Retail – Direct to the Public

This system does really well where there is a high population and the producer is in a close proximity. In most cases the consumer knows the producer or the product is personalised in other ways by photos, newsletters and pamphlets.

This is very successful in the eastern USA as it is densely populated and so producers are never far from their consumer base. Farmers' markets are common; for around 20 to 30 weeks of the year producers will come and sell their produce direct to the public. The public believes they are getting something more for their dollar, be it fresher, cleaner, organic or just more personal.

Some farmers I met used this to their advantage and had set up a box ordering system, where they would supply a box of mixed produce each week at a fixed price. Their customers would collect the box from a pickup point on a given day.

Depending on the scale of a producer they might use all the systems, with their bulk going to wholesale markets and then selling to specialty shops and restaurants as well as farmers' markets and box order systems.

One such business was Harmony Valley Farms in Wisconsin USA, they grow a whole range of organic fruit and vegetables in an isolated valley and sell wholesale to stores but only to ones that educate their customers about the product, so they know what they are buying and are prepared to pay a bit more for it.

They also went to farmers' markets in Madison and Chicago once a week as well as running a box order system. They store vegetables to keep this running for as long as possible.

They run a weekly newsletter for their farmers' market and box order customers containing

recipes and information and nutritional value about their product. They believe in making the newsletter light and fun education for their products, not preaching to people.



Farmers' markets in USA

Another example is from Ein Hatzera in the Negev Desert in Israel where I met a private farmer, Nahum. He grows 1000 ton of Galia Melons in two by one month time slots per year. He exports 70-80% to Europe and sells the next grade to Israeli supermarkets with the 3rd grade going to the traditional markets. He has a flock of sheep in sheds so they eat any throw outs. There is no waste. His market is simply a niche time slot, producing when the supply in Europe runs short.

Some other examples in Retail Marketing, I saw was in livestock. Ron Gargas from Western Pennsylvania USA grows organic grass fed beef, had them butchered and cryvaced into individual labelled packages and sells them at farmers' markets. He claims he received \$2250 US/animal (approx \$3000AUD) because of his marketing technique.



Joel Salatin from Poly Face Farms, Virginia USA grows organic chickens and butchers and packs them himself with family members employed. In the USA it is legal to kill up to 20,000 chickens per year without being an abattoir if it is sanitary and unadulterated which the authorities have to determine. They pre-pack chicken meat and sell direct to the public and to restaurants. His big advantage is high population. I believe Virginia is the most densely populated state in the USA.

Both systems have advantages; the deciding factor is where the population base is.

Conclusions and Recommendations

“Balance doesn’t come from having one foot in hot coals and the other in an ice bucket.”(Jerry Brunetti)

- The nutrient density of produce is more important than a total lack of toxic inputs
- To change to biological farming straight away will be really hard; economics must outweigh ideals or you won’t be in business.
- Need to take it slowly, start by using a consultant or analytical lab that uses both the Albrecht and Reams method of soil testing, start using less acid treated fertiliser and more natural or high quality fertiliser products.
- Work on conserving and building organic carbon levels in the soil by cultivation and timing methods.
- Producers need to be rewarded for high quality produce not just penalised for not complying.
- Governments need to reign in retailers who are profiteering, not lean on farmers to clean up the environment, when the profits aren’t reaching farmers’ pockets. Profits are staying with the retailers who want to pay less all the time for produce, forcing farmers to concentrate on yields and aesthetics rather than the functionality of foods and how that is affected by how it is produced.
- Good functional foods should be the best and most efficient health dollar spent, instead of going to farmers to do the job right, Society is going to pharmaceutical companies to treat a whole host of symptoms generated by poor diet and nutrition. A lot of which is caused by over processing of foods.
- Successful marketing gives people what they are looking for, either by niche time slots, or by having something that appeals to different mindsets, be it organic, fresh, or personal.
- Having the produce is one thing, to be paid a fair price for it is another and will become increasingly challenging as the world markets become more saturated with produce and dominated by chain retail outlets.
- To grow superior produce, and then market it properly, businesses need repeat sales. I believe ‘personalising’ one’s own produce is probably the easiest and most cost efficient way of ensuring consumers recognise your product again, and repeat purchase at the retail level. A simple sticker on each item is a good start (whether it is fruit/vegetables or animal products). It allows consumers to identify your product. If they had a good experience the first time, they can recognise it on the shelf and choose it again next time they shop.
- The Environmental Assurance Legislation that is in its primary stages in Australia, although a good idea, concerns me because Australian farmers have no environmental subsidies like all of Europe and USA. We are being fed the rhetoric that it’s “an even playing field”, but sadly what I became aware of the more I travelled was, that the scales are tipped against Australian farmers immeasurably, and the more economical pressure there is, the more the environment will suffer, as farmers can’t put in more dollars than they are earning.

Disclaimer: This report reflects my observations and views, not necessarily those of Nuffield Australia or any other sponsors.

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