Australian Nuffield Farming Scholars Association

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Report of the Study Tour to the United Kingdom and Europe

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1991 Victorian Nuffield Farming Scholar

Subject: The Dairy Industry, in particular the conservation and use of silage.

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The following report represents my interpretation of, and opinions derived from information obtained whilst on my scholarship and is therefore not necessarily the views of any organisation or persona visited.

1 Objectives

To study the feeding of dairy cows; in particular the conservation and use of silage, and its effect in association with low levels of concentrates on milk production and composition.

To learn the overall effect of grazing, breeding, cow health and labour management on cost efficient milk production.

2 Europe and GATT

I joined the eight scholars above in London in February for a six week tour of Southern England, Brussels, France and Wales which gave us all a very good overview of Western Europe agriculture, but probably more importantly, the politics of why and how the EEC functions. There are many lurks and perks, and to be a successful farmer there, one has to know firstly how to milk the system, and then how to farm. The result is that about 20% of farmers get 80% of the subsidies.

The winds of change are sweeping across Europe - we hear about the political ones every day, but there are also economic pressures on farmers.

There has been a cut in grain prices, lamb support; dairy quotas cut another 2.5% (albeit with compensation roughly equal to the profit for 3 years), and milk prices in the UK have been about the same for 3 years. In many areas the EEC is not a level playing field (through trying to get there with "one Europe" policy starting 1992), especially in environmental and health issues.

The list of things Governments are expected to do is growing - any market related payment is going to distort the market - (we have seen this in a small way - in world terms- in our wool market) - we have to create an environment in which it is not viable to create surpluses.

"A surplus is an embarrassment only when it is subsidised: unsubsidised it becomes an export success." (The Economist).

The ultimate end must be to:

- Reduce product price related support
- Product prices must relate to value
- World food prices should firm - but not to current EEC levels.

There is no doubt protection will fall because of:

- International pressure
- Budgetary costs
- The political balance is shifting; in the last 40 years the original six EEC members farming population has dropped from 16-17 million to 5-6 million (66%) - what will happen in the next 40 years?

There will be no improvement in access if there is no breakthrough in GATT; if there is, it will probably be to Eastern Europe. When Eastern Europe, especially former East Germany, gets its act together with some of the best soils in Europe, the oversupply problems will not improve. Our market is certainly Asia - and that will not fall into our lap, we have to work for it and earn it.

Do Customers Matter?
Price wise - No - Real food prices are falling and incomes are rising. Food safety - Yes - **very important.** There were large market losses to beef and eggs through B.S.E. and Lysteria in 1990.

3 Milk Production

I have no doubt that most cows in Victoria have the genetic potential to produce at leat 50% more milk than they do. (Born out to some extent by our cows still milking at 75% of their peak in their 9th month of (a 10 month) lactation due to very good seasonal conditions. Work on lactation curves by Dr Lawrence Jones (Cornell University) would suggest that our cows were not well enough fed in early lactation, and their peak was lower than it should be). We do not feed them well enough to allow them to express their genetic potential.

Having said that, we should still keep improving our breeding as much as we can afford to.

Most dairy farmers agree that improvement in the efficiency and profitability of milk fat, and particularly protein production, is the major future selection goal in dairy cattle breeding.

A breeding experiment at "Langehill", Scotland now under senior animal breeding specialist Dr Geoff Simm was started in 1977 using two selection policies:

1. Selection Herd - the best proven AI bulls available based on I.C.C. (UK breeding value called "improved contemporary comparisons") with UK proofs or converted I.C.C.'s.

2. Control Herd - Bred to proven sires with I.C.C.'s of around 0 kg fat plus protein.

This was done to measure the progress in production resulting from feeding, as distinct from feeding and management.

Table 1.	Production figures of the selection and control herd.		
	1977 Start	1987 Selection	1987 Control
Yielding (kg milk)	5732	7518	6498
Fat %	3.87	4.33	4.13
Protein %	3.18	3.19	3.19
Fat + Prot (kg)	404	565	476

The genetic part of this improvement is the difference between the production levels of the selection and control herds, which amounted to 89 kg fat + protein. They further examined the results in the above table to see what should be expected from the I.C.C.'s of the sires used. This was done by comparing the pedigree index (the sires I.C.C. + half of the maternal grandsire's I.C.C.) for heifers with the actual production.

Table 2.	Expected and realised changes in production		
	Expected change based on hfrs pedigree index.	*Actual Results* Heifers	All Parties
Milk (kg)	100	99	99
Fat (Kg)	10	9.1	8.7
Protein (kg)	10	9.5	10.4
Fat + Prot (kg)	20	17.8	18

Actual increases were very much in line with those expected from the pedigree index.

4 Efficiency

Langehill have also researched the efficient conversion of feed into milk. Feed intakes have been measured since 1977 in a total of 415 cows and heifers.

Table 3.	KG milk, fat + protein, dry matter intake, efficiency and margins over all feed costs, in the first 38 weeks of lactation for high and low pedigree cows and heifers.			
	Heifers		Cows (Lact. 3-5)	
Pedigree Index	High	Low	High	Low
Milk kg	5849	5225	7621	6997
Fat + Prot kg	460	423	583	546
DM intake kg	4175	4082	4834	4714
Efficiency Mj/Mj	0.375	0.352	0.415	0.392
Margin over all feed costs £stg	648	545	915	813

Table 4	Performance, efficiency and margins over all feed costs in the first 38 weeks of lactation for selection and control cows.			
	High Concentrate*		Low Concentrate#	
	Selection	Control	Selection	Control
Milk kg	7032	6164	6030	5309
Fat + Prot kg	512	466	463	406
DM intake kg	4645	4408	4065	4010
Efficiency Mj/Mj	0.388	0.366	0.414	0.367
Margin over all feed costs £stg	759	643	732	599

* 2400 kg concentrates per cow per year.
# 1000 kg concentrates per cow per year.

RESULTS: High pedigree index cows produce:

a)More kgs of fat + protein in both high and low concentrate systems.
b)More efficiency in both systems.
c)Have an advantage in margin over feed costs of over £100 (A$240) in both systems.

5 Feeding

Probably the most striking difference between Victoria and the UK and Europe, is our generally poor pasture quality (notwithstanding some very good pastures on some top Victorian farms), and hence poor quality conserved fodder, with lower than desirable metabolisable energy (ME), and protein values, leading to poorly fed cattle. Dr Mike Wilkinson (formerly of Hurley Research Inst) after a visit here in autumn 1991, called our controlled grazing systems, a controlled starvation system. Those that do supplement their cows, (including myself) feed an unbalanced feed (usually one straight grain with no buffering to stabilise the rumen Ph), and then wonder why we do not obtain high yields from our cows. This is possibly born out when viewing Sean Tolleener's herd, near Sacramento in California, with a herd average production of 11,200 lts, 416 kgs butterfat, 363 kgs protein per cow per year in a herd of 600 cows. The cows are eating 29 kgs of feed per day and none of these cows (except dry cows) were fat!

Sean's biggest problem was cystic ovaries which is often indicative of poorly fed cows.

Ivor Bending in his report of the "Straights Feeders Group" visit to New York State, said that crude protein levels should be above 18.5% and Dr Mike Wilkinson commented that cows short protein get fat.

Trials at Hurely have shown that cows fed:

Concentrates kgs *	3	6	9	12
Silage intake kgs#	10.9	10	8	6.7

* Concentrates crude protein 20%, ME 12 - 12.5
# Silage 15 - 16% crude protein.

The substitution rate is .5kg of silage for one kg concentrates.

It was shown more protein
= higher dry matter intake
= higher milk yield
= higher protein yield
= higher lactose yield
But the same fat yield.

Fat in the diet depresses protein %. High protein in the diet tends to reduce fat % but increase milk and protein for energy. We should work towards total dietary protein of 18% i.e. 3 kg/cow/day of 35% protein concentrate or 6 - 8 kgs/cow/day of 18-20% protein concentrate (provided that we have fully utilised cheapest food sources, i.e. grass, silage and crops and it is economical within the Australian price structure).

The value of total mixed rations (TMR's in the US, or diet feeding (the same thing) in the UK has had a considerable impact on production. The UK system is much more forage (grass based) like ours, than the US, though their cows (UK) are housed for four to six months of the year, when they are generally fed grass silage and grain or pellets. Complete diet feeding involves having an analysis of all available feed stuffs, then formulating the least cost ration, and then balance it to suit the herd's average weight, milk production and stage of lactation. It is not uncommon for there to be three groups on different rations viz: high producers, low producers and dry cows.

I think diet feeding, or TMR's increases production because, firstly, the better balance in the diet, and secondly, and probably equally importantly, it makes the farmer think about what he is doing. He consequently pays more attention to detail - often the difference between the successful and struggling farmer.
Kay Carslaw - an independent consultant, suggested that if over one tonne of concentrates per cow / year are being fed, then diet feeding is a proposition. Less than one tonne, it would probably not be economic.

6 Silage

There are many different types and ways of storing silage, including corn silage in tower silos and bunkers (pits), alfalfa (lucerne) haulage in tower silos in the US and a grass silages on both sides of the Atlantic. I will concentrate on pit silage in the UK and Western Europe as it is similar to our grass silages.

It is difficult to accurately compare our silage within the US and Europe because we use a measure of Digestible Dry Matter (DDM) in our analysis, and they use Digestible Organic Dry Matter (DODM).

The Victorian "Feedtest" suggested that silage with 60% DDM is suitable for lactating dairy cows, equivalent to about 54% DODM. All the ration formulations I saw overseas suggested a level of 60% DODM as a minimum. When trying to calculate what to feed with silage, a lower protein value than the analysis should be used, e.g. a silage analysis of 18% protein should be downgraded to about 14% when assessing the feed value. Work done at Hurley suggested there is little benefit in feeding more than 6kg/cow/day of 18-20% protein concentrates with high quality silage, but with poor quality silage then 9 kg of concentrates are needed. Therefore, high quality silage can save 3kg of concentrates per day.

7 Silage Additives

Silage additives- are used extensively in the UK where silage generally has lower dry matter levels (16-30%). The additives fall into two broad groups:

1. Fermentation restricted by chemicals; formic acid is by far the most common and reliable, but sulphuric acid and formaldehyde have been used. Restricted fermentation lowers the proprionic acid which concentrates the fat and protein in the milk and cows gain weight. Chamberlain (Hannah Res. Ins.) has put protein (casein) into the cows abomasum which switches restricted fermentation silage back into milk production. In mid lactation 250 grams of casein lifted milk by 4 kg per day (25%) and protein yield 3.1% to 3.6% (36%). A similar response as to BST. Cows probably need to be in a surplus energy situation.

2.Fermentation stimulation by biological means. There are three groups of these:
a) inoculants.
b) enzymes.
c) sugars.

A stimulated fermentation (similar to high sugar dryer silages) has higher proprionic acid levels and the energy tends to go to milk production. With over 90 different silage additives on the market and little independent research, with all sorts of claims by different manufacturers, it is a veritable minefield. Formic acid is one of the cheaper additives, extensively used, and a lot of research showing its benefits when ensiling materials with a low dry matter content (less than 25%).

Silage effluent is a major problem in the UK. A few farmers are feeding it to their cows. To some extent the Dutch have overcome this by making high dry matter silage (30 - 45%). Their opinion of silage additives (inoculants and enzymes) is that if the conditions are right for these products to work, 25% + DM, they are not needed.This is a conflicting opinion with Hillsborough (N. Ire.) where they feel inoculants are effective in 15-30% dry matter silage, providing the grass has a high sugar level. Work there suggests silage has to be above 30% DM to eliminate effluent problems. Direct cut silage

systems at Hillsborough have always produced more milk per acre than wilted silage - this contrasts with most research looking at milk per cow from different silages. The silage process involves losses of about 25%. If the grass is ensiled wet, then the loss is in effluent, if the grass is ensiled dry, then the loss is in the field. When making silage and weather conditions deteriorate, "if in doubt, keep going". There will be losses, and generally they will be higher if left to dry in the field.

David Roberts (Creighton Royal, W Scotland) has brought the silage cutting date forward ten to fourteen days., to obtain better quality silage and regrowth. If there is a hold up in cutting (weather, machinery) then quality is still OK.

Big Bale Silage

Big Bale Silage- used on smaller farms, or for small areas when not convenient to put in a bunker. The most important part of making big bale silage is that it must be wrapped *immediately.*

Additional Comments

- Silage heating loses money.
- Dry silage has a higher Ph, but goes off quicker with exposure to the air.
- Quick filling of bunkers is **VERY** important for good silage.
- Any sugar product can be made into silage.
- Even heavy rain will not dramatically wet wilted silage.
- Some farmers are growing dual purpose cereal corps. If they are short of silage then they make whole crop silage (some add urea when ensiling), otherwise they take the grain from the crop.
- Some farmers use caustic treated straw (especially barley straw) as silage.

8 The Milking of Cows

I visited many milking sheds (parlours) throughout my travels and no two sheds were the same. In terms of throughput per man hour the Aust/NZ rotary sheds are amongst the most efficient. The trend in large overseas herds tends to keep the shed working for long hours with employed labour. This works well and improves the use of capital investment when the cows are housed or in feedlot situations.

Dr. Ed O'Callaghan (Moore Park, Ire) has recently completed a thesis for his PH.D. on milking machines and developed a new milk cup liner after testing over 30 different makes. Some of the main points to come out of the research are:

- Devices or practices that give fast drops in claw vacuum increase the rate of new mastitis infections.
- Under milking has been associated with increases in the somatic cell count and damages the milk producing lobuli in the udder.
- Avoid under milking by:
  -installing a high performance regulator.
  -use recommended liners, and change them every six months. Liner slips increase the incidence of new mastitis infections due to slippage. The cause of the slippage is largely due to the unstable mouthpiece vacuums due to small bore liners. Slip levels increase with milk yields. Liner design has evolved from trial and error rather than from analysis of the effect of specific changes in liners.
  -use 3 kg clusters
  -good pulsation graphs
  -minimise milk lift
  -adequate vacuum reserve; depends on many factors, therefore you should be able to drop one set of cups in twelve with no more than 4kpa drop in vacuum.

9 Heat Stress in Dairy Cattle

Heat stress occurs in cattle over 27C (80F). Production is lowered because they drink more water giving gut fill which lowers the metabolic rate, which lowers fat and protein yields. It also lowers the rumen PH and affects the high producers more severely.

A lower minimum temperature at night is more important than high daytime temperatures, and humidity constitutes 2/3 of the stress and heat 1/3.

Israel attributes a 10% production loss to heat stress. Conception rates are dramatically lowered with more early embryonic deaths. Their summer conception rate is about 24% cf. with their winter conception rate of 52%.

There has been a lot of research in Israel in controlling heat stress by Dr Steve Rosen, (Speaker at the International Stockman's Conference, Texas A & M). The key factors are :

- shade must be a minimum of 4m high, preferably with a white roof.
- sprinklers should give large droplets (sprays raise humidity) with a flow rate of 13.5 lt per minute.
- sprinklers run for 30 secs every 5 mins (enough to wet the cows) <u>evaporation cools the cows</u> - not the water.
- fans with an airflow of 3m/sec - fans are not necessary with low humidity.

- cool shaded drinking water.
- spraying the roof is not efficient.
- cooling drinking water is not efficient and lowers water intakes.

Results

- an increase of 4.5 lt of milk in extreme conditions.
- cooled cows commence oestrus 17 days earlier after calving.
- no difference in steers and calves.

10 Marketing

Agriculture is moving from government control to commercial control, so it must be more in tune with market requirements. Producers must try to move away from single bulk commodities and follow the market right through to the consumer.

The farmers generally get the smallest share of their end product; the retailer often takes 35%, so farmers must try to add value to their products and be price makers not price takers.

The Dutch are good marketers, especially through their co-operatives, with many farmers working together to give volume, add value, and be large enough to have some muscle with the large retailers.

The co-ops must be producer co-ops, not merchant co-ops, with their own product and the farmers must be committed to their co-ops.

Successful marketing will include the following points:

- the concept must be right.
- only produce what the customer will buy.
- pick out a market segment (geographical, type of customer, etc.).
- business environment - if over supply and /or costs too high, then get out of the market.
- constant review of product range.
- consistent contact with the customer.
- project customer requirements 2-3 years ahead by - information from the market (research)
  - product planning.
- try to be a price fixer.
- good distribution and promotion.
- stay with the basics and use existing skills.

Advertising compliments other marketing activities, e.g. new products may be equally or better promoted with free samples, tasting, etc., than large sums of money spent on advertising.

Joint ventures can be very good with the right partner who has an equal interest and objective - harmony and cohesion are vital.

11 Successful Business Equals Successful Farming

Rapid expansion in farms in the 80's - **Ready, Fire, Aim.**

To succeed in the 90's - **Ready, Aim, Fire!**

We must set goals and have a vision of where we are going - how many 40 year old let alone 25 or 30 year old farmers have thought about retirement and estate planning?

Get up early - work till you drop - do you want to continue this?

Business Plan

We must talk about achievements; build on successes; and failures (someone else may be able to succeed where we failed - perhaps a wife or son?).

It is critical to know our weaknesses and build on our strengths.

Generally farmers are guilty of:

- too little financial planning.
- too little forward planning.
- too little pre-investment analysis.
- too much optimism about future profits.
- a lack of interest in marketing.

A successful manager must provide good leadership, a good environment - work is fun - give credit for achievements, opportunity for growth, and recognition of others strengths and achievements.

Some key motivational points are :

- set the tone; be positive, make work fun.
- criticise in private, praise in public.
- be fair and consistent.
- job satisfaction.
- rewards.

At all the really successful farms and factories which I visited, people were one of the key factors in their success.

Delegation is essential. Kay Carslaw suggested delegation MEANS moving right away.

12 Diversification

On my travels I saw and heard much about diversification, from bed and breakfast accommodation, to processing and selling farm

produce, to completely off farm enterprises. Whilst diversification has many attributes, there are some points to consider:-

- if you are on a good thing; is it possible to expand existing business rather than divert resources to a new venture.
- if the core business is not successful, it may be due to management, and the diversification may go the same way.
- any diversification must have a stop loss provision, and in most cases this is one year's profit from the main business. The diversification if unsuccessful, will not only go under itself, but may put the main business at risk also.

Why?

The main business is probably successful because of the operator - the diversification not only drains cash, but the key operator's valuable expertise; so the main business suffers doubly.

13 Conclusion

You have heard it all before (and I hope the dairy co-ops are listening), but the world does not need bulk products. We need to add value and keep profits here - not sell bulk products, and then buy back value added products - we should be adding the value.

We need help from government - not subsidies, but favourable trading conditions to match those of our competitors.

The government tells us to be efficient - we are efficient. To compete on the world market - we can; if our inputs are at world market levels and our domestic markets are not decimated by dumped products.

We have high interest rates and unjustifiably high real interest rates (the difference between the inflation and the interest rate) high A$ rates, duties and taxes on components (such as tractor parts, when whole tractors are imported tax free) which makes it hard for Australian manufacturers to compete.

There is a minefield of rules, regulations, and restrictive work practices to make sure that those who survive all else, have their products held up on the water front so that delivery dates cannot be met and perishables go off.

Max Jelbart

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