High Quality Pastures ; the basis

Grazed pastures provide New Zealand's bread and butter

BUT

NZ's soils, pastures, animals and their environments are biological systems ,with biological limits.

Agriculture must work within these limits.

Therefore, with the need for low-cost production,

continual intensification is biologically impossible

The future is bright

- The world needs more food
- NZ produces high quality food
- Pastoral systems have lowest costs , and can be almost entirely renewable
- Only 10% of world milk is produced from grazing systems , NZ's main advantage
- The real competitors are outside NZ

The future is bright

- NZ has a good climate for pasture growth
- Some good soils
- Good pastures
- Good cows
- Good people [but not enough of them]
- The best country for grazing systems, with their low costs of production

But, recently and in future

- Cost of production increasing due to changes in farming systems and to dramatic increases in the cost of some key inputs
- And will soon have to include ‘environmental’ costs
- Some other countries can produce milk at low costs, and are increasing output rapidly
- Prices for products subject to intense competition, both fair and unfair
- And, tariffs and subsidies have not entirely gone

Topics

- Historical perspective
- Dairying in NZ and the World
- Advantages of grazing systems
- BUT, effects of intensification
- The basics of efficient , profitable grazing systems
- Farmers are the experts in systems
- Urgent need for more agricultural specialists

Historical perspective ; mainly for dairying

- 1920-1940; NZ's essential integrated basis established ,including NZ Dairy Board and Herd Improvement
- 1m cows in 1920; mainly J
- 1950-60; high prices after the war [$7/kgMS]
- 1960-90; EEC formed; tariffs and subsidies produced Surplus Butter Mountains, Dumping ; low prices
- NZDB encouraged farmers to feed milk to bull calves in 1970s
- 2m cows 1960 to 1985; J with increasing HF
- Zero N or Maize silage until 1970s; then rapid increases

Perspective continued

- 1985 Roger Douglas reconstructed NZ agriculture; necessary, but disaster for some, especially young farmers.
- Bad news stories every day ; public perception that agriculture was a failed, sunset industry
- This perception has not yet disappeared
- 1990s; A NZ government with no Minister of Agriculture
- 2.4m cows in 1990; J with more HF, heavier cows

Perspective continued

- The focus of farming shifted from farm development and production, onto financial goals, wealth-creation and capital gains
- 3 m cows in 1996; now mostly HF, heavier cows
- Increasing awareness of environmental consequences ; GROWING FOR GOOD published in 2004.
- Dairy Industry working to control/minimise adverse effects of cows and their effluent
- High milk prices in 2001/03 ; farm intensification accelerated again
- Palm Kernel Extract introduced ; 600,000 t/year now
- 2001; NZDB disestablished; Fonterra established; share value increased

Now

- 2007-08 ; Global Shocks; oil, energy, food, climate-change, credit and financial system etc. High milk price , but high costs of land, fertilisers and grains
- NZ; Frantic efforts to obtain more cows , and more feeds; and to develop new dairy farms; including irrigation
- New private milk companies setting up in NZ
- 4+ m cows in 2008 ; mostly J*HF
- ? Effects of all these on ground-water quality and soils ?
- ? Effects on costs of production and farm profits?
- ? Effects on NZ's ability to compete in the world?

A personal perspective

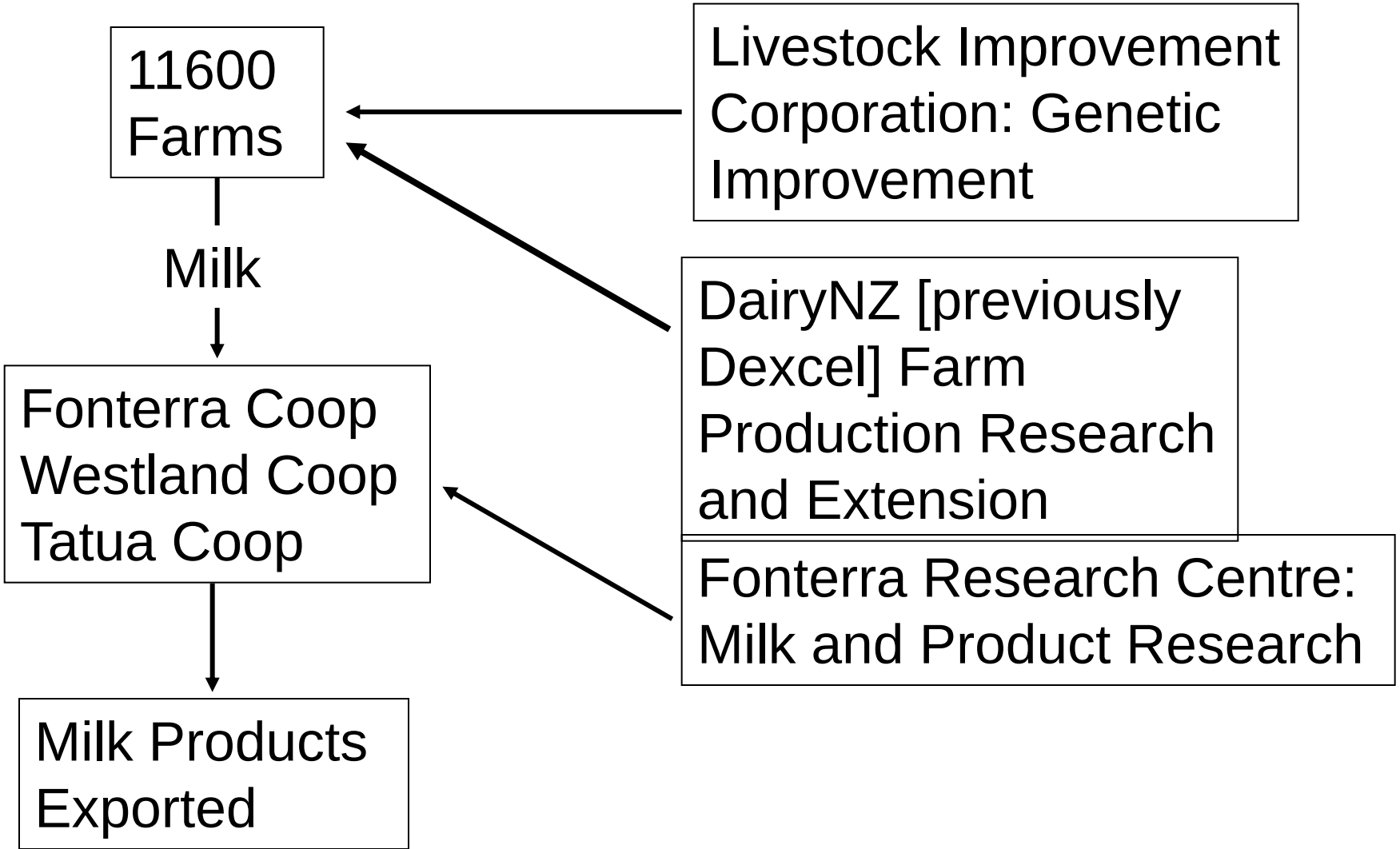
- The majority of farmers have always tried to care for the environment, more than most other people
- Personally,always moderately ‘sustainably green’
- Then listened to Guy Salmon at Grassland conference at Taupo , 2007; the need to pay for environmental costs
- Sept 2008; I read about a “ recovering environmental plunderer”, the biggest carpet manufacturer in the world
- If his company can do it , grazing farmers, in their truly renewable systems,can/ must do it

Dairyfarmers' dual legacy to future generations must be;

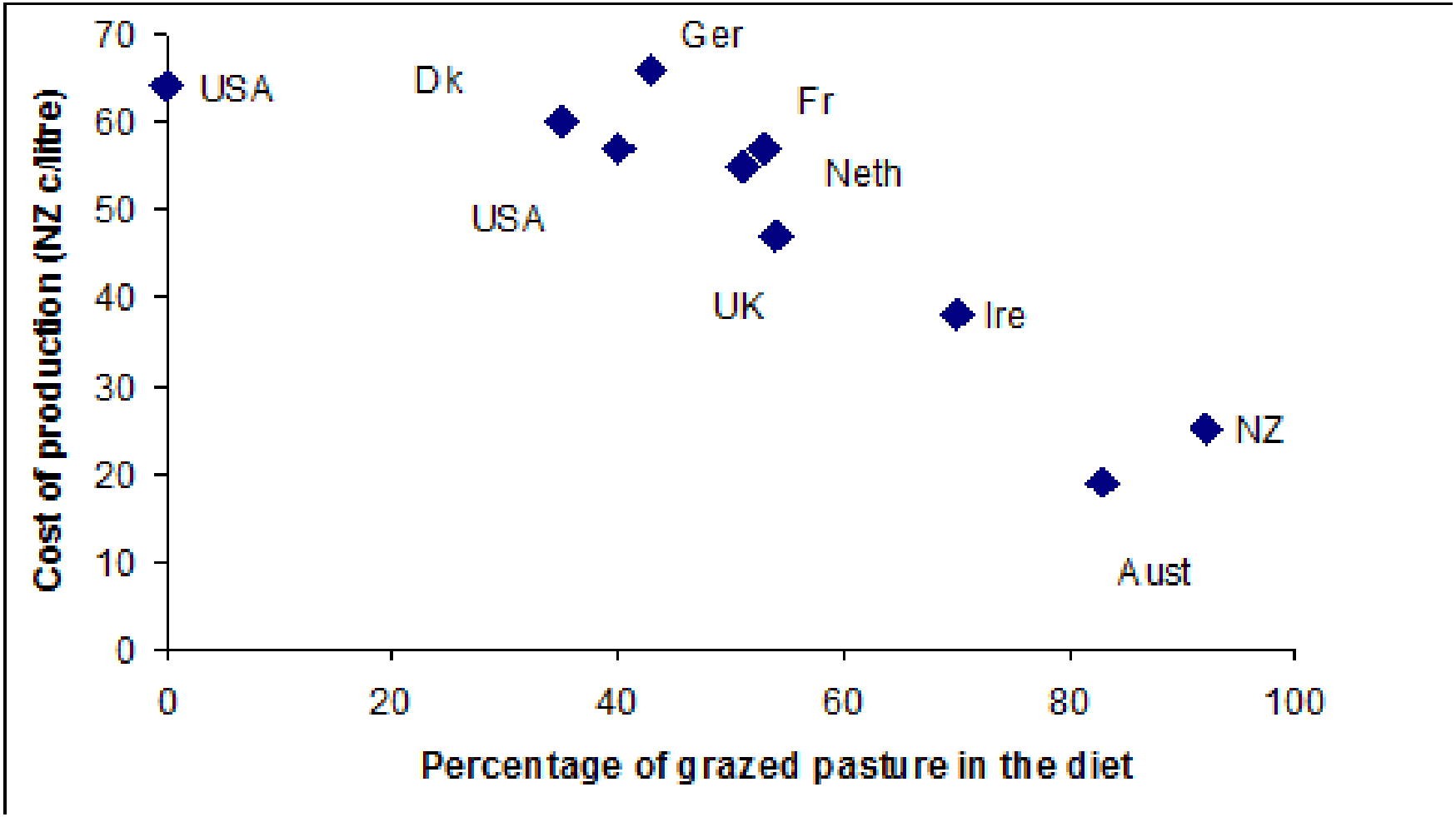
- To leave a countryside that is clean and green , in which New Zealanders can live and play happily

- Leave a strong Dairy Industry, based on healthy, happy cows and sustainably profitable farming systems, for NZ dairy farmers, and for New Zealanders

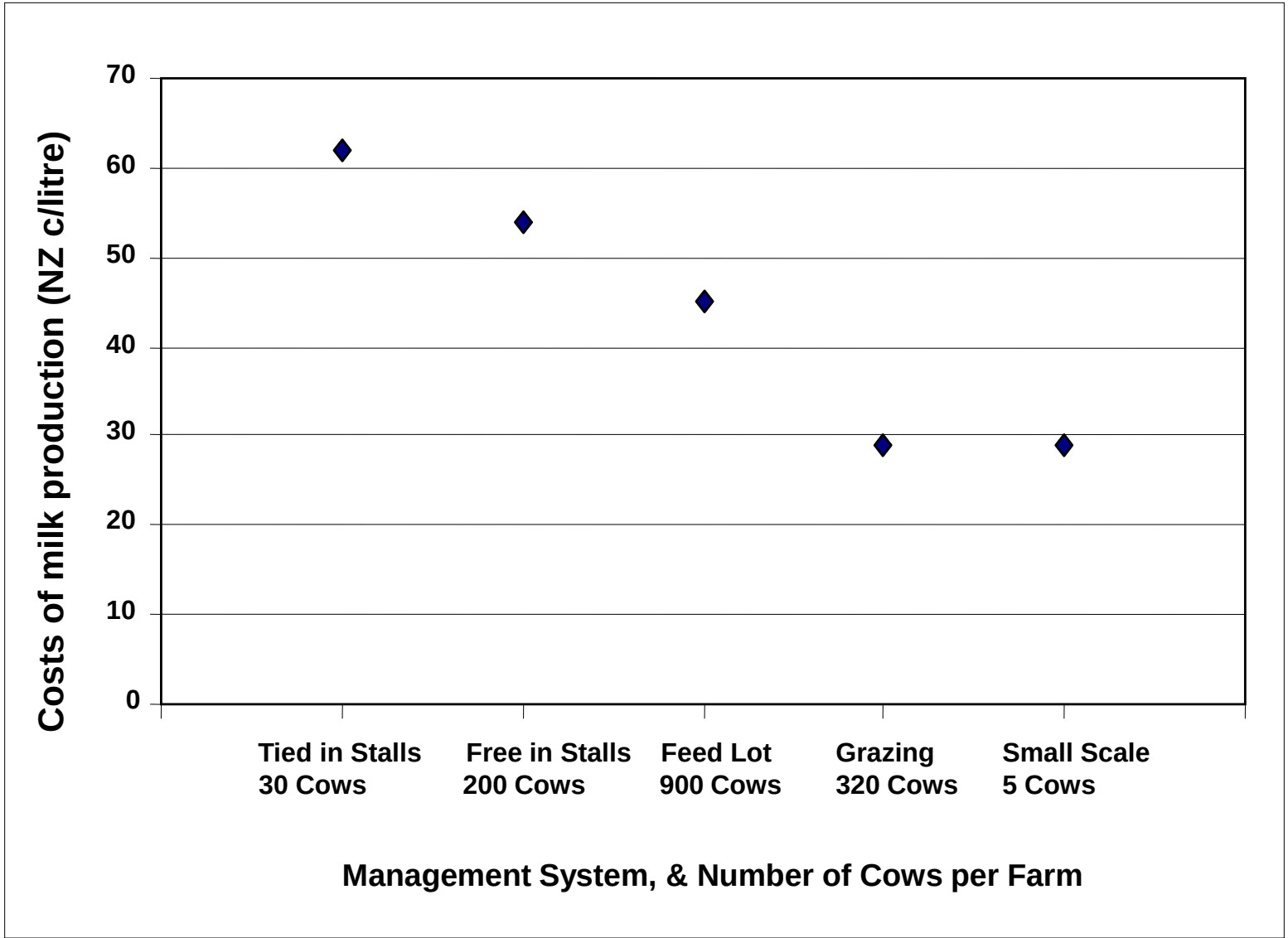
The Integrated NZ Dairy Industry; Cooperatively owned by NZ Dairy farmers



To illustrate lower costs of Milk Production in systems using more grazed pasture, in different countries (Dillon et al 2005)



Cost of production for different Management Systems in different countries (IFCN, 2006)



Grazing Systems;biological systems with limits

Strengths

- Lowest costs per kg milk solids
- Healthiest conditions for cows
- The main feed, grazed pasture ,produced renewably by photosynthesis from atmospheric C and harvested by renewable cows that feed themselves

Weaknesses

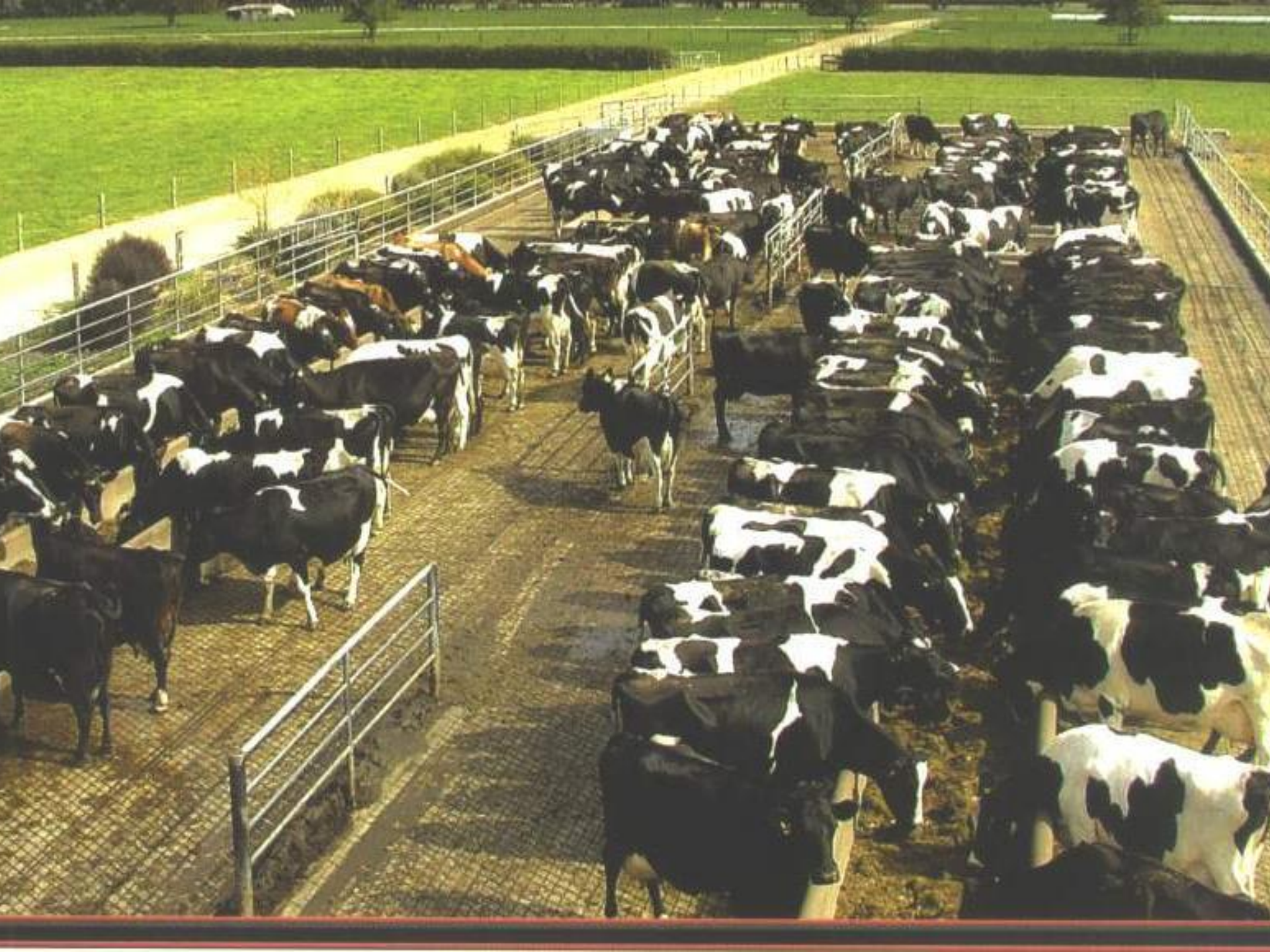
- Grazing limits daily intake & yield per cow
- Shorter seasonal lactations
- Seasonal variations in milk
- Leaching of N & P from excreta
- Effects of animals on soils
- Green House Gases produced

High Quality Pastures ; the basis


High quality milk from many different types of pastures

The best conditions for cows

Feeding dry cows in winter



Rapid increase in number of cows from 1990 to 2008, and effects

- Increased from 2.4 million to 4 million, between 1990 and 2008 [With few cows imported; not possible in most countries]
- Must have required fewer culls, with ‘bad’ cows retained , and more replacements, with ‘poor’ heifers kept.
- Effects on genetic values, mastitis and SCC , and on fertility and calving dates?

Rapid increases in scale, and intensification on-farm; 1990-2008

- Number of cows ; from 2.4 to 4.0 m cows
- Stocking rate ; 2.4 to 2.8 cows/ha
- Milksolids/cow; 265 to 335 kg/cow
- Feed required; 10 to 20 m t DM
- Dung and Urine: Huge increase too
- Nitrogen/ha ; 20 to 150 kg/year
- Maize silage; rapid increase too
- Palm Kernel; 0 to 600,000 t/year
- Cows per herd ; 164 to 345 cows
- Farms with paid employees; 1990 few – 2008 the majority ; new stress of managing people

Real intensification is very recent in biological terms

- It has occurred mainly in the last 20 years
- Some effects only just being felt now
- Some effects may only become apparent in the long term
- What will they be, if any?

Infectious Intensification Disease of Dairy Farmers

- Have paid a very high price for land; therefore must produce more milk per hectare.
- From more cows, feeds & fertilisers.
- More milk produced , but at higher cost per kg milksolids; profit not always increased
- And more N and P into ground water, more C emitted , more water needed
- Reduces international competitiveness and environmental sustainability.

Effects of intensification on the international competitiveness of NZ dairying

- The same systems of production [housing and grain feeding] are used by pig farmers all over the world
- NZ cannot export pig meats competitively
- As we feed more supplements
- And as more cows are housed
- More machinery and work; higher costs of production
- When our dairy systems become the same as those in other countries, how will NZ be able to compete in the world market ?

Must farm within the farms biological limits

- Pastures and their soils are not feed-pads
- Must match the system to the biological capabilities of the land, and to environmental requirements
- Continual intensification will inevitably exceed the system's limits; for example;
- Compaction of soil and increased nutrients leached into ground water
- Must also meet imposed limits ; locally in NZ and globally too

Mitigation; a solution or a new problem?

- Some mitigation needed and sensible, BUT:
- Eg Low dairy cow fertility; Inductions and CIDRs and system-changes [eg split calving and extended lactations] used to mitigate effects
- But , they just covered up poor management , and enabled low-fertility cows to survive
- Now, attention has refocused on the real problem , low fertility, and the real solutions, good management and good genetic selection.

An example of mitigation madness

- The suggestion that , in order to reduce nutrients leaching into ground water , NZ dairy farmers should house their cows
- When the obvious, and biologically and financially sensible, solution is to reduce the nutrient loading on the soils [eg lower stocking rate]
- Effects on costs and ability to compete??

Brazil and Ukraine, 2 potential competitors

- Both these countries can produce milk at low cost
- Both are rapidly increasing milk production
- And are there other countries with these capabilities too?
- Will they all face the same environmental and other constraints that will be faced by NZ farmers?

The example of Ukraine

- Black soils are included in its constitution as ‘a national treasure’
- 32 m hectares of agricultural soils [70% black soils], excellent for grain
- 3 m cows , small dairy exports; but growing quickly , and close to Europe
- Must watch their progress

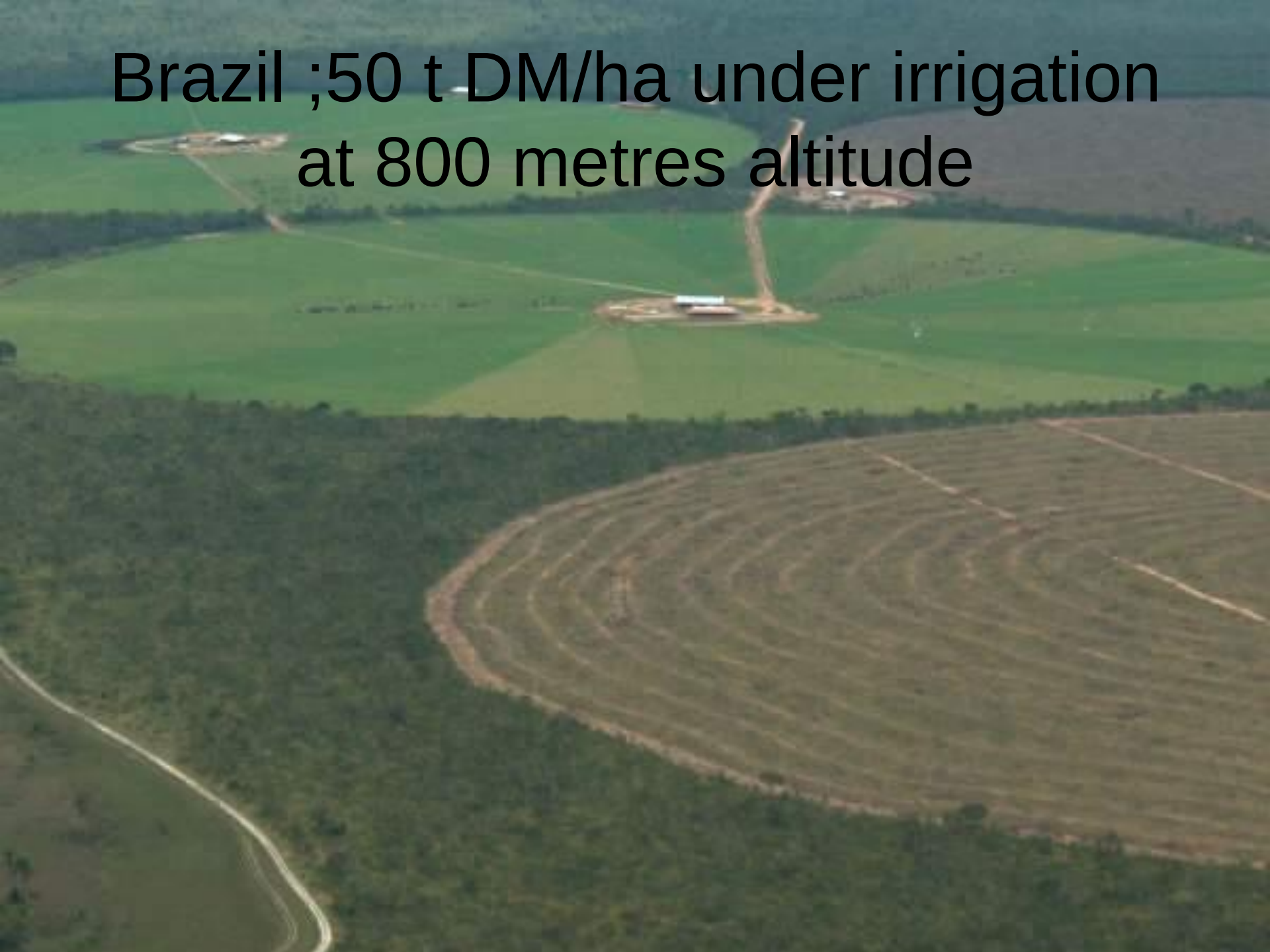
The example of Brazil

- 50+ million hectares of pastures , mostly tropical, 9MJ ME/kgDM.
- But can produce over 20tDM/ha without irrig, and over 50 tDM/ha with irrig
- Many by-product feeds available , eg from sugar cane
- Low-cost dairying expanding rapidly ; with significant exports soon
- Must watch their progress too

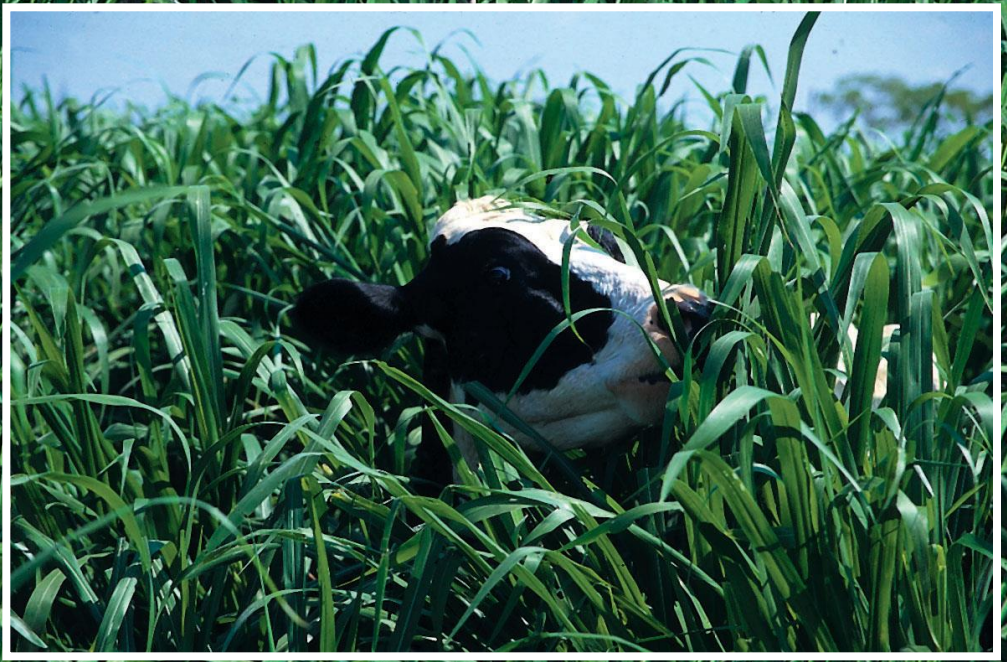
Brazil; Many different types of cows are farmed including Bos Indicus crosses

Brazil; 25tDM/ha ; no irrigation

Cynodon sp. – Tifton 85


Brazil ;50 t DM/ha under irrigation
at 800 metres altitude

Pennisetum purpureum "Elephant grass"



Brazil; Enthusiastic extension workers and field days

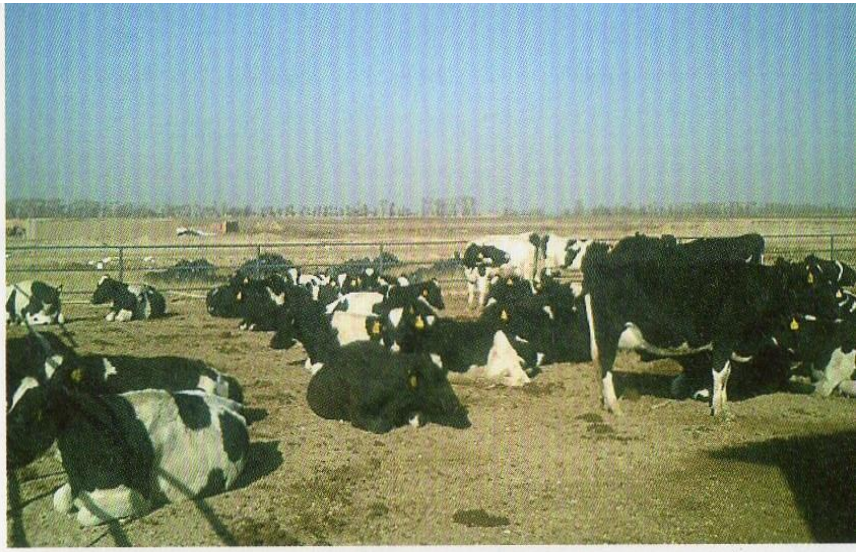
China

- Cannot talk about the world without mentioning China
- Will increase milk production rapidly, but huge domestic demand
- Questions about constraints and controls for milk quality and effects on environment

CHINA: AN OLDER FEED-LOT

CHINA –

A modern feed-lot



As our most famous agriculturalist Richie McCaw said;

- “It’s simple; just hold on to the ball , and get over the advantage line !”
- The basics of profitable farming are simple too :
- Feed eaten and converted into milk;
- But doing it well requires real knowledge, understanding and skills [Domain Knowledge!]

Profit, Production & Efficiency

- **Profit: $**

Milksolids sold (kgMS) x (Payout – Costs) $/kgMS

- **Milksolids sold (kg MS)**

Feed eaten (tDM) x Feed conversion efficiency kgMS/tDM eaten

(For all cattle, on all land)

Basic efficiencies must be measured for all farms

- Pasture eaten ; tDM/hectare, and as % of pasture grown, or pasture utilised
- Feed conversion efficiency ; kg animal product / tDM eaten
- Nutrient budgets
- And used in quantitative analysis of the performance of the whole farm business

FOR EXAMPLE; FARM 1

- 86 Ha; 220 cows[HF/J], 84,000 kg MS
- One cow: 450 kg LWt , must eat: 380 kgMS/year 4.4 tDM/year
- Feed Conversion efficiency,
- kgMS produced/tDM eaten: = 86 kgMS/tDM
- 220 cows must eat 968 tDM/year
- Feed imported 90 tDM/year
- Pasture eaten at home 887 tDM/year

=10.3 tDM/ha

Total feed efficiency,

kgMS produced per tDM offered; = 79 kgMS/tDM

For example;Performance of the herd

- **Fertility and calving pattern:**
  E.g. 78% pregnant after 6 weeks mating
  94% pregnant after 12 weeks mating
  87% calved in 6 weeks
- **Genetics**, $BW; BVs for key traits e.g. fertility.
- **Age structure**; % 2 years, 3 years and older cows; their yields, SCC, fertility.
- **Minimise "involuntary" culls** (empty; high SCC etc)
- **Maximise "chosen" culls** (low yield)
- Reduce total replacement rate to 'economic optimum'

Farm efficiencies in the future; output per unit of limiting factor?

- Now; expressed per tonne DM or MJ ME or per $
- In future ; will it include Kg milk and meat produced per kg N leached , or per tonne carbon emitted?

Increased performance per animal good for the environment

- Higher output per animal usually equates to higher feed conversion efficiency
- And probably also to more animal product per kg N leached, and per t C emitted
- But usually associated with lower pasture utilisation efficiency
- Great skills needed to combine high animal efficiency, good pasture utilisation, good environmental management AND low costs

Farmers should be recognised as the real experts in systems

- This was certainly true when the farmer did all the work on-farm, and managed the business too]
- But is it so true now, with larger farms , and more employed staff?
- Every farm is a system, and can provide an enormous amount of information
- Full implications of this valuable information can be recognised and extended only by experienced specialists

Lessons Learned from Farmers

- Overstocking and short lactations
- Responses to supplements; management of substitution
- Integrated systems
- Type of cow required (incl. fertility)
- Fast throughput at milking essential

Well trained, motivated people on-farm are essential ; actual numbers in 1999

14,360	Farms
35,250	People
5,250	Farm managers
5,000	Herd managers
10,750	Farm assistants
1,400	University degrees
11,300	6th Form Certificate

People required on dairyfarms in 2020 [but will not be available]

9,000 Farms
550 cows/farm
3 staff/farm ; 1 graduate; 2 apprentices

- 250 Consultants; all postgraduates
- 50 Researchers; all with PhDs

- BUT too few people are now studying agriculture

- And, where are the new agricultural specialists?

Responses to additional farm staff

- Exciting paper at SIDE Conference, 2008 by Southland farmer
- Employed MORE staff in order to do things better
- Good responses to extra labour input, in both herd performance and financial results
- Good farming
- Attracting and retaining staff not a problem
- Applicability to whole industry?

A specialist in Grazing Dairy Systems

- Understands the basics of soils, pastures, animals and management
- And their integration in farm systems
- Can apply all this to real dairy farm systems
- Has a working understanding of past and current dairy farm research , and of new developments
- Is familiar with industry issues , in NZ and globally
- Has considerable experience with a range of grazing systems on dairy farms

The real cost of the deficit in agricultural specialists; an example

- An excellent agricultural graduate employed by a NZ company in 2007
- Immediately developed a new simple, but quantitative, system to assess client's farm systems
- And to do a cost/benefit analysis of the product's suitability for the client's system
- How much extra on-farm progress and profit has already resulted ?
- How much faster would the national rate of progress be if 50 such excellent graduates were produced each year , instead of just a handful?

Invest to produce more good people

- The best investment now, with the highest returns
- But can more young people be attracted into agriculture now?
- How to do it all?

People Improvement Corporation, with a single focus ,to generate good replacement people

- Based on LIC, successfully producing high BW replacement heifers for many years
- GOALS for PIC ; to identify the number of high BW agricultural specialists needed annually
- AND then to ensure that this number is generated by Universities , ITO etc
- BUT ,the Industry must prove that it values them
- AND ,everyone must actively encourage more young people to study agriculture

A structure to foster Specialists in Animal Production from Grazing Systems

- The Society of Dairy Cattle Veterinarians [of the NZ Veterinary Association] is an excellent professional , development arena for Specialists with shared interests and expertise in Dairy Cattle health
- NZ needs a Society of Specialists in Grazing Dairy Systems for specialists in healthy cows
- EG In association with the NZ Soc Animal Prod, NZ Grassland Assoc , NZVA and NZIPIM

The future; great opportunities , but increasingly demanding

- Continued global demand for high quality human foods produced by NZ grazing farms
- World market will continue to be fiercely competitive,
- Low costs of production essential, in spite of continued increases in costs of inputs
- Grazing farmers must farm within the biological limits of their farms with happy,healthy animals; and within legislated environmental limits

The future , continued

- Availability of good farm staff will not increase, and farms will continue to get bigger
- OAD is the future [with/without robotics]
- The design of farm systems must be continually analysed and adapted
- Farmers must understand the principles of their own systems , not rely on recipes, and be aware of global developments
- And more agricultural specialists urgently needed

The future for NZ is bright , provided that all farms use GFP

- Some good soils, and good pastures and cows
- Good climate for pasture growth/grazing
- Good Dairy Farming Practices have recently been relegated dismissively to “Cows and Grass”, with more focus on wealth-creation and human resources
- But GDFP is the basis of profitable ,sustainable dairy farming
- With many new entrants each year, knowledge of GFP cannot be taken for granted
- GFP must be restored as the first priority; it is basic Domain Knowledge!

THE END