# Food Security & Climate Change Policies

MEAT & WOOL
NEW ZEALAND

International Policy Studies Roundtable
**13th November 2008**

**P08050**

# Historical - Demand

Food Prices are set by a number of complex relationships

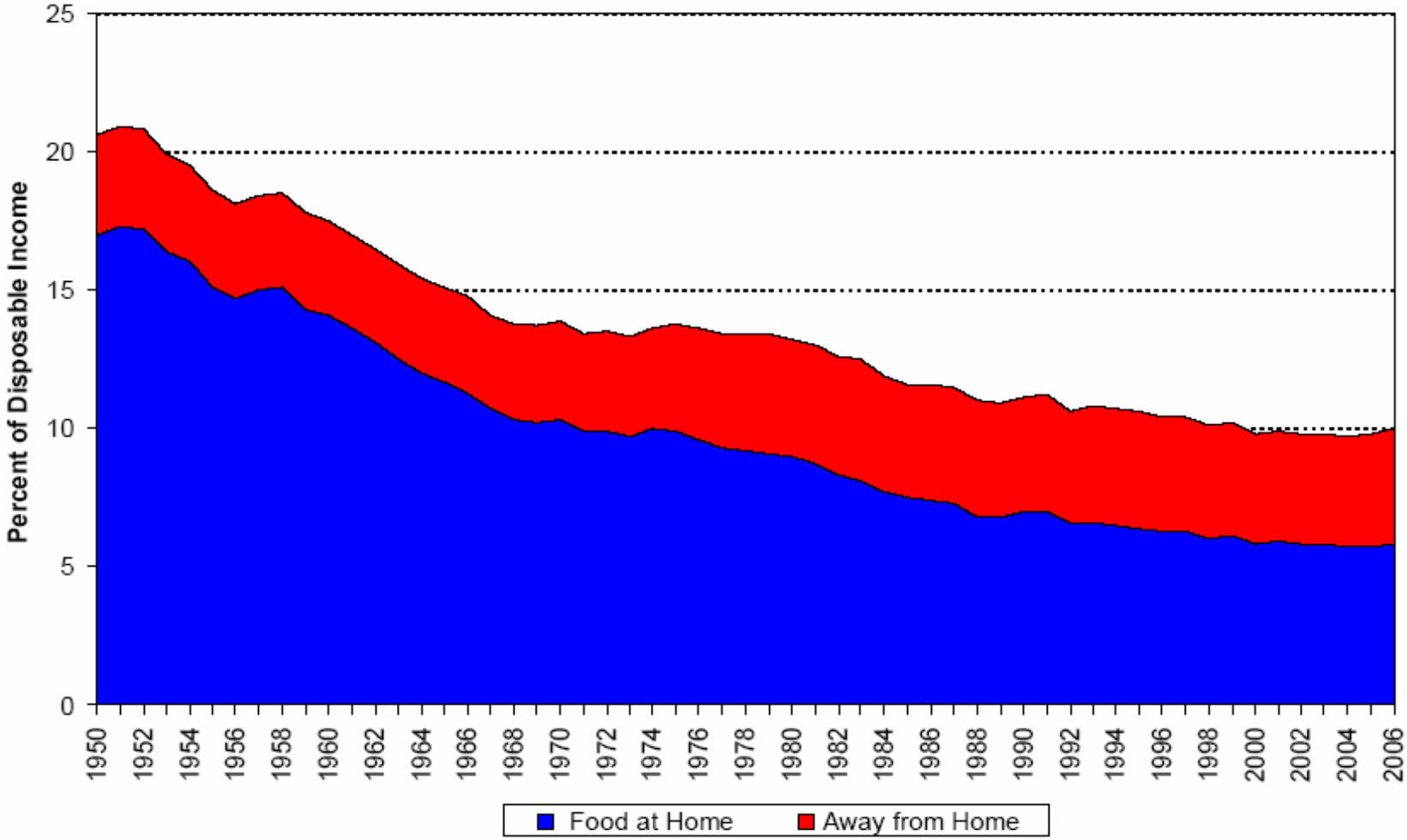
Historically:

1. Food prices have declined in real dollars
2. Disposable income spent on food has declined
3. Globalisation has led to an explosion of different market segments

# Disposable Income on Food

MEAT & WOOL
NEW ZEALAND

**Figure 5: Consumer Food Expenditures: Percent of Disposable Income Spent on Food at Home vs. Away from Home**




Source: USDA, Economic Research Service

# Historical - Supply

Supply has responded to demand by:

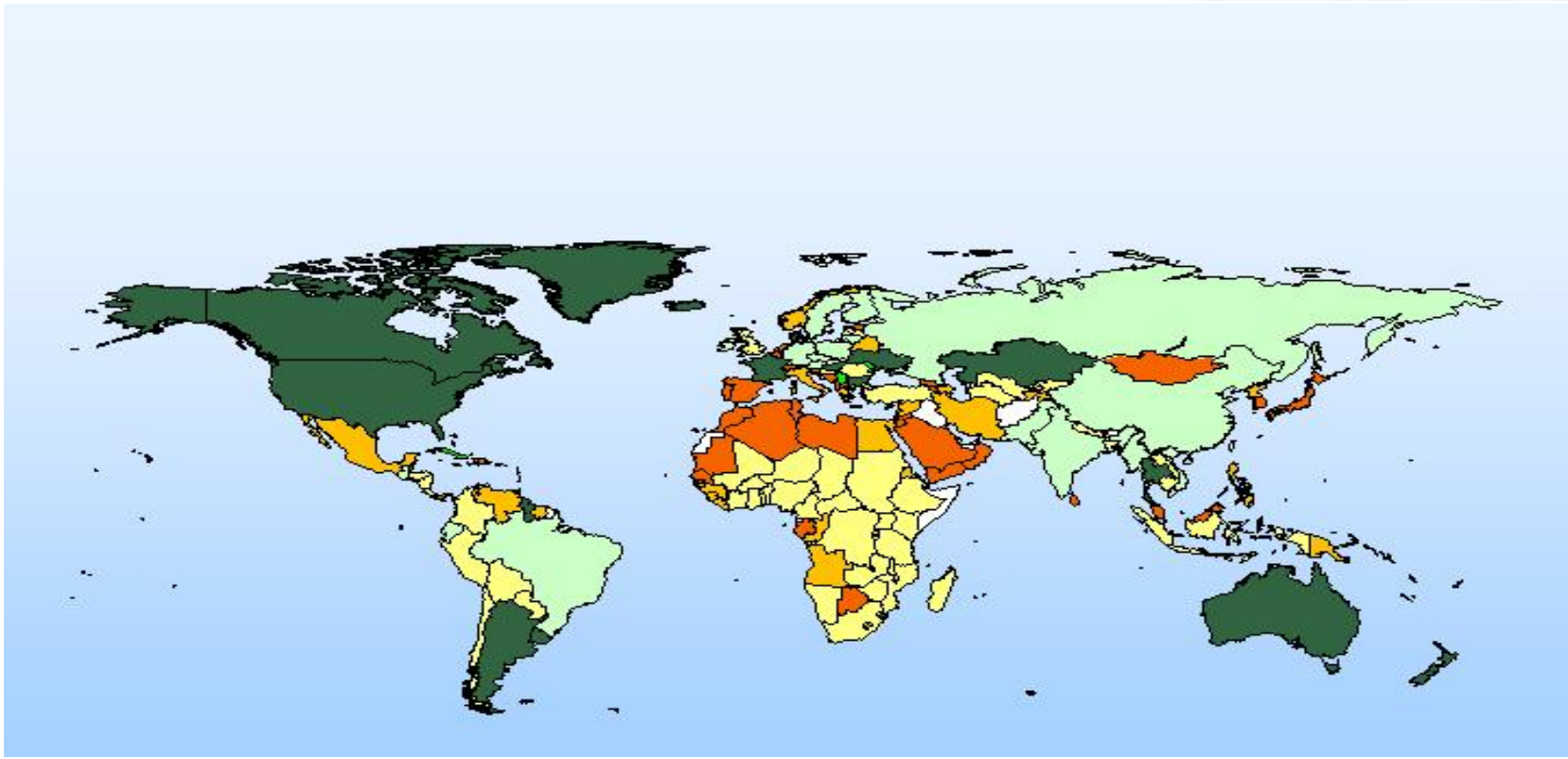
**Productivity+++**

1. Aggregation of farm size
2. Aggregation of other value chain participants
3. New Systems – e.g. feedlots
4. New Technology – e.g. lamb racks
5. Genetics – per animal performance
6. etc

# Net Trade in Food

MEAT & WOOL
NEW ZEALAND

**2002-2004**



% (Exports-Imports) / Consumption (calories)

< -50 -25 0 25 50 > No data

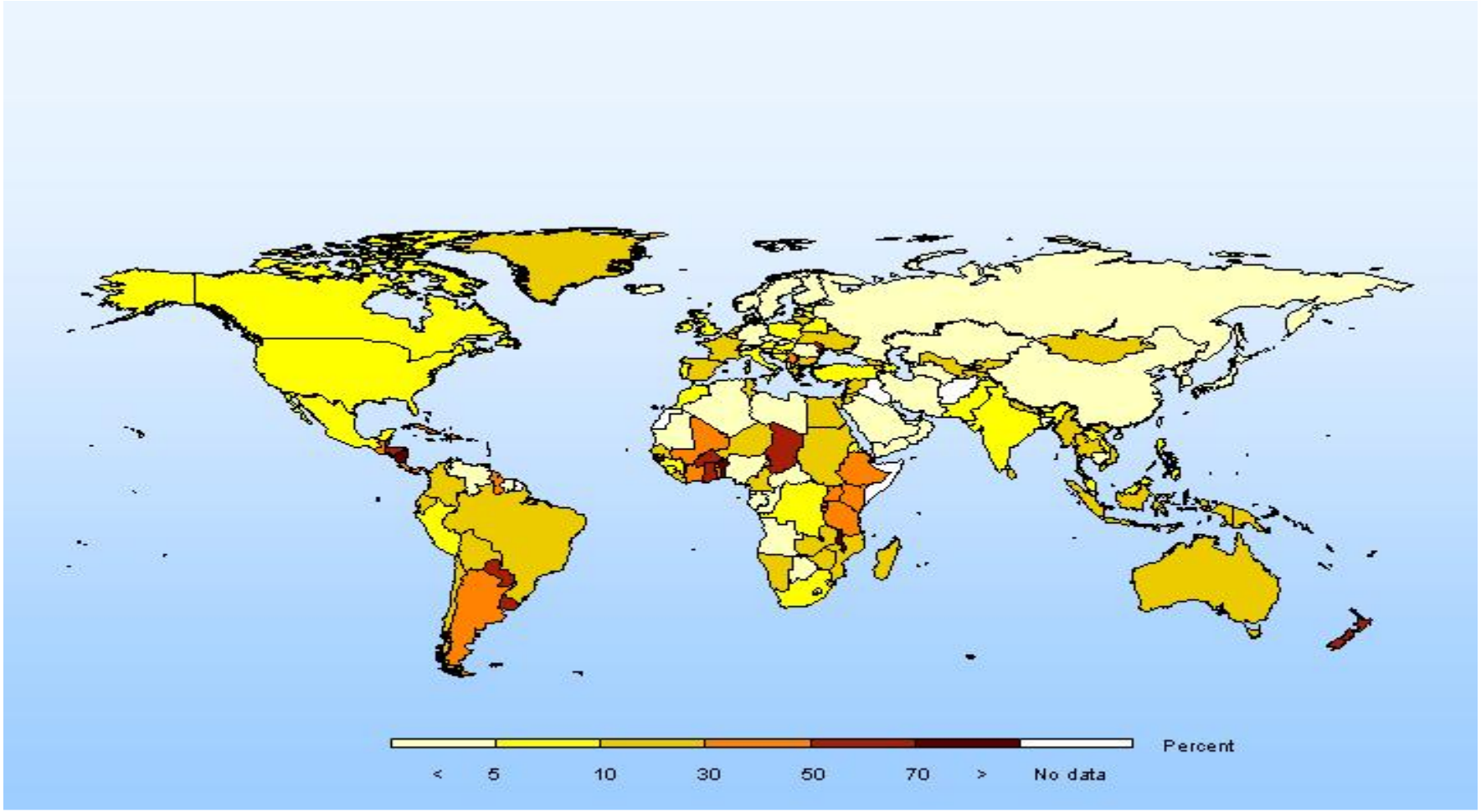
**Source: FAO Statistics Division**

# Share of Agricultural Exports

in Total Exports

MEAT & WOOL
NEW ZEALAND

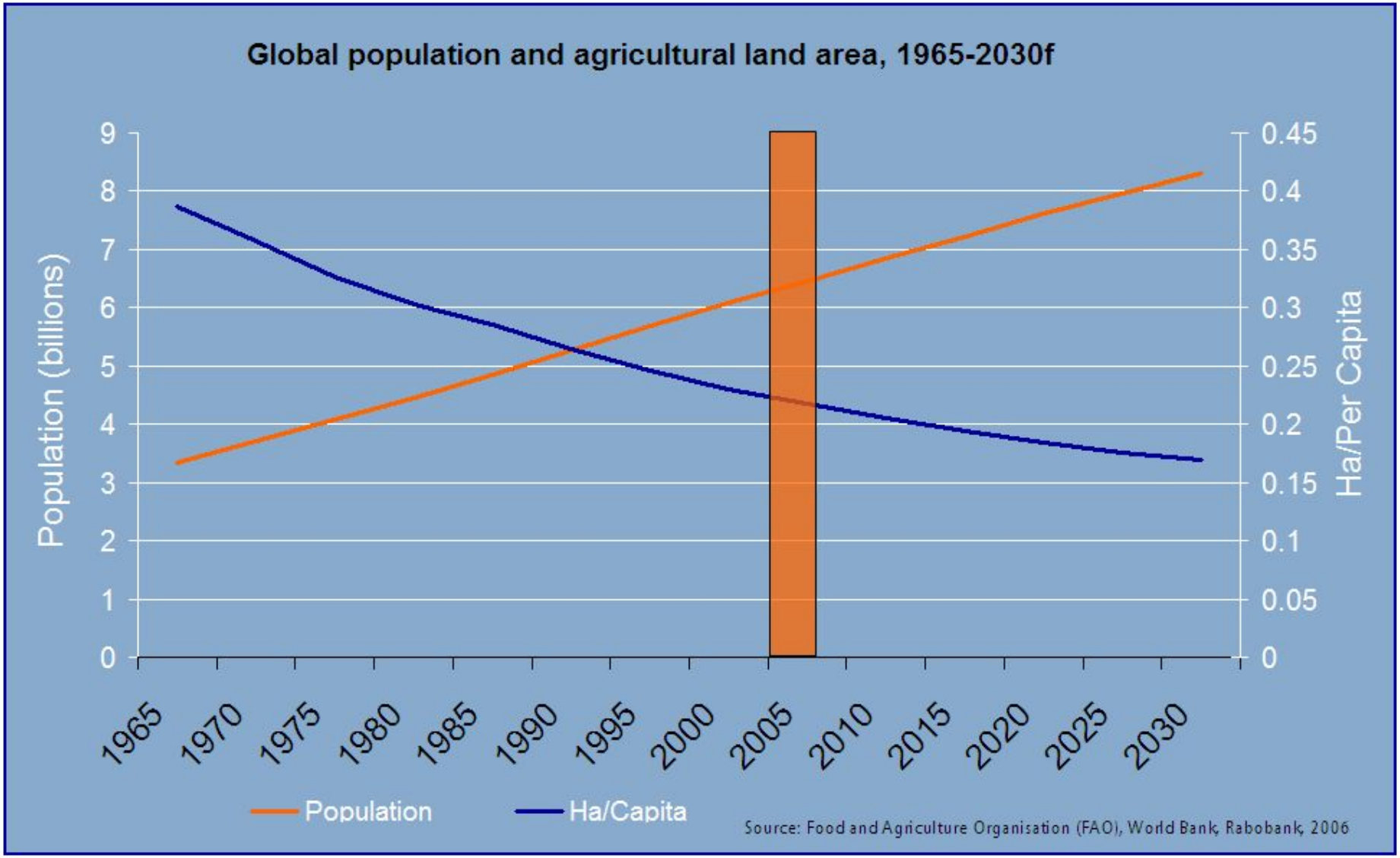
**2004**




**Source: FAO Statistics Division**

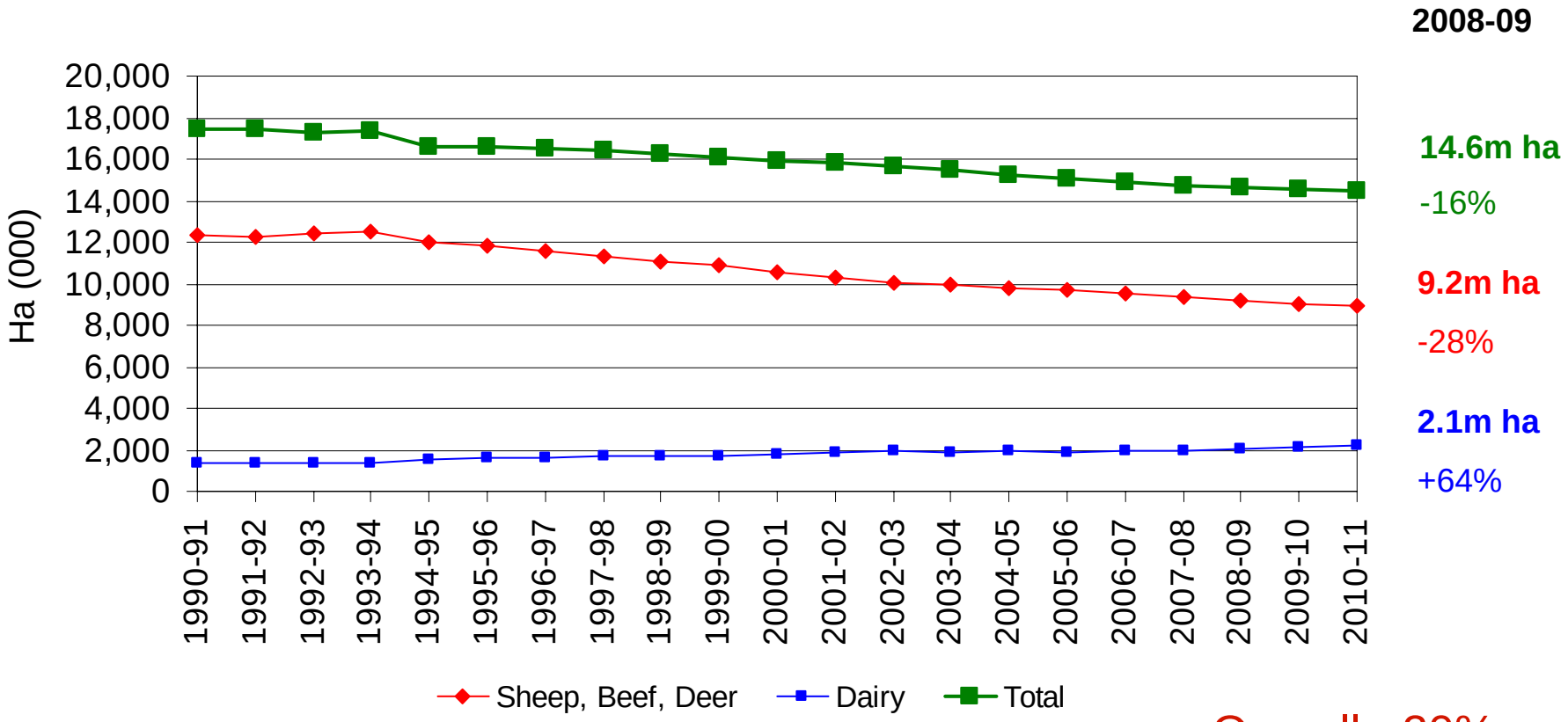
# Available Agricultural Land

MEAT & WOOL
NEW ZEALAND



# Land Use Trend

Total Pastoral 2008-09 = 11.2 m ha

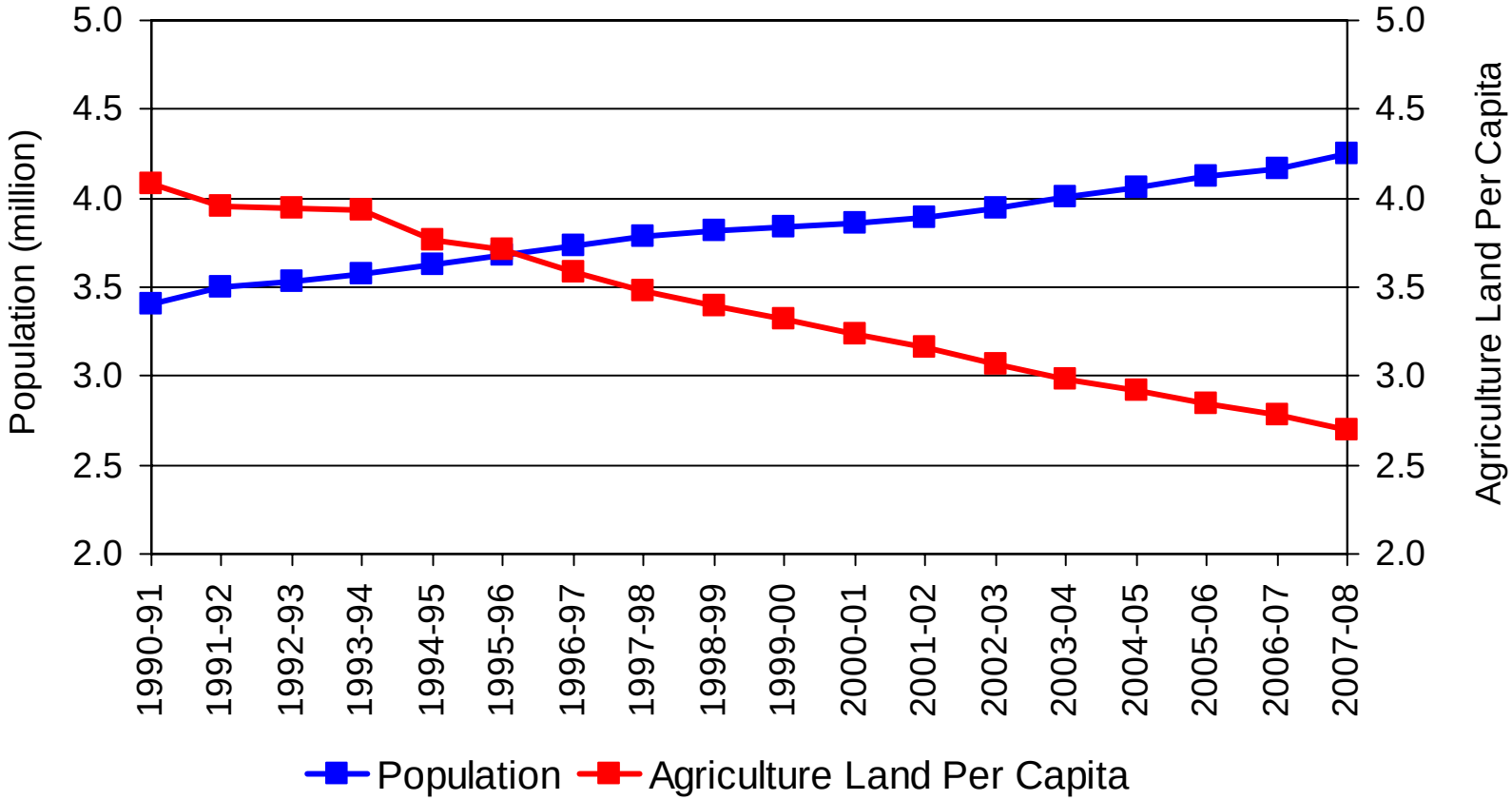



Source: Meat & Wool New Zealand Economic Service

Overall -20%
-2.7 m Ha
since 1990-91

# NZ Available Agricultural Land

Total Ag Land 2008-09 = 11.5 m ha



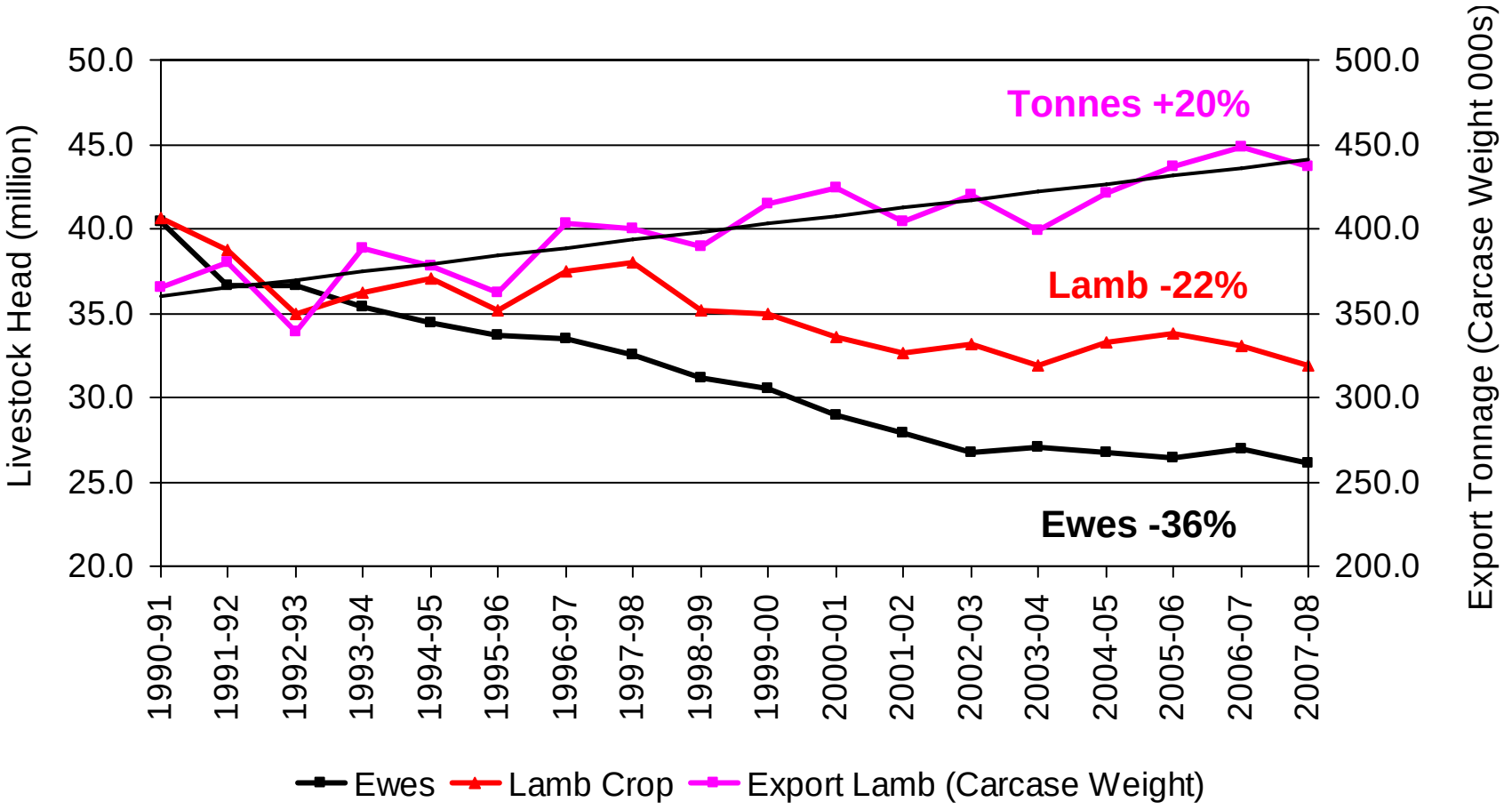

Source: Meat & Wool New Zealand Economic Service
Statistics New Zealand.

# Farm No's and Size

| | 1984-85 | 2007-08 | |
|---|---|---|---|
| Commercial S&B Farms | 22,000 | 12,900 | *-41%* |
| Av Stock Units | 3,424 | 4,235 | *+24%* |
| No of Dairy Herds | 15,881 | 11,630 | -27% |
| Av Cows at peak | 144 | 337 | *+134%* |
| Commercial Horticulture | | 7,000 | |

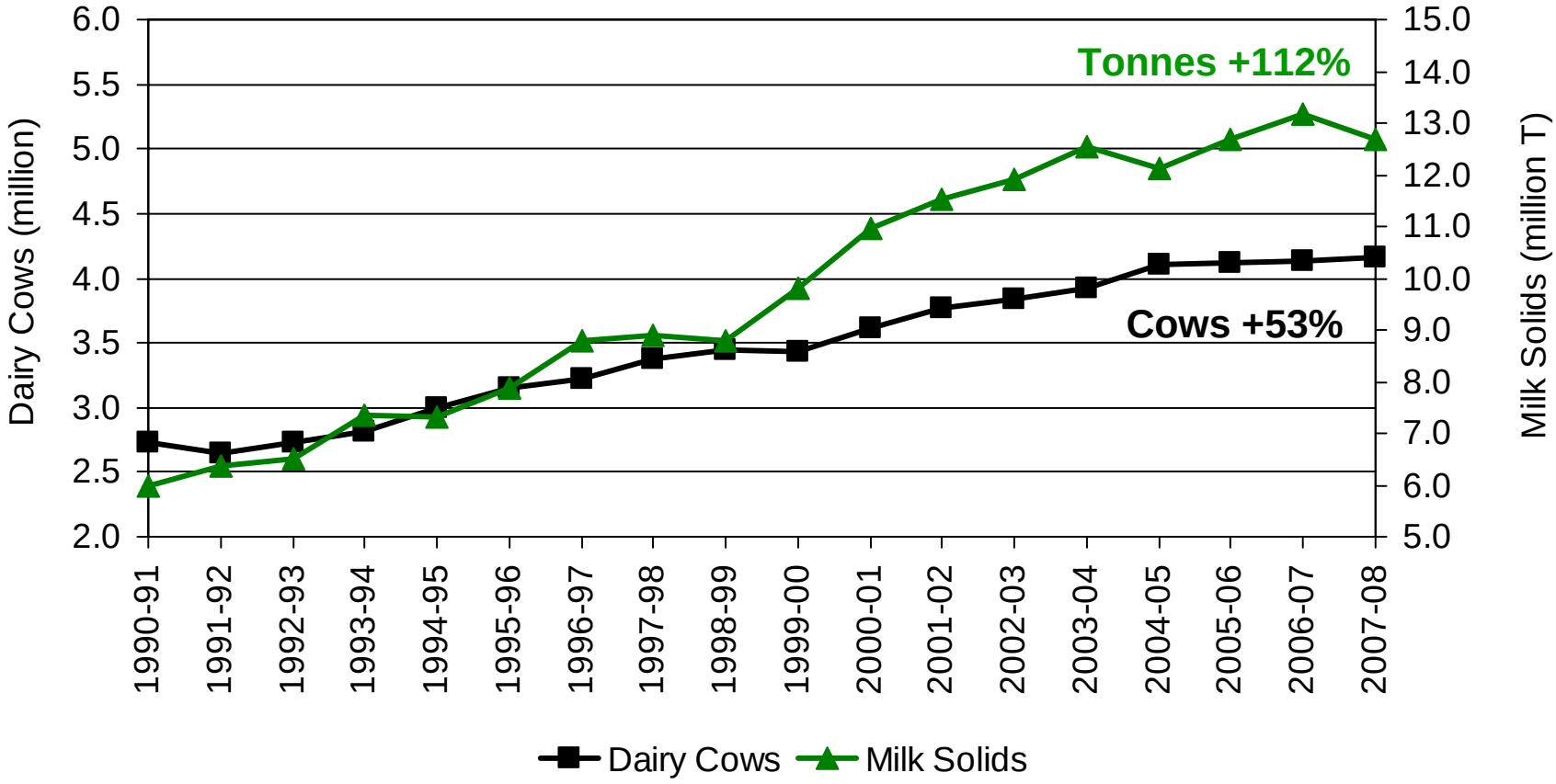
Source: Meat & Wool New Zealand Economic Service
Livestock Improvement Corporation, Horticulture NZ

# Sheep Productivity



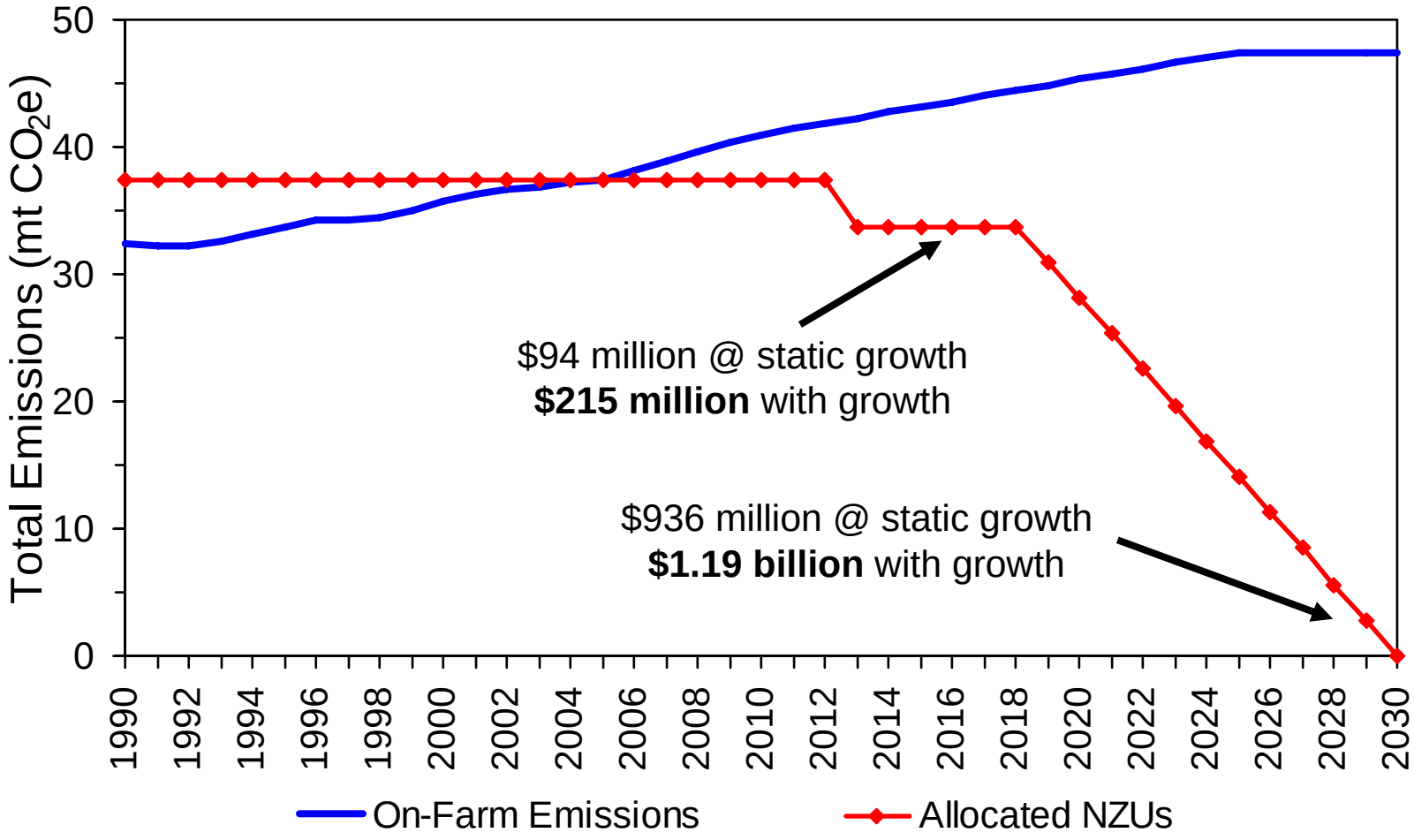

Source: Meat & Wool New Zealand Economic Service
Statistics New Zealand.

# Dairy Productivity




Source: Meat & Wool New Zealand Economic Service
Statistics New Zealand, LIC

# On-Farm Emissions - Costs $25/t




Source: Meat & Wool New Zealand Economic Service
MAF

# Case Study – Sheep & Beef

| Year | Increased Expenditure per farm* @ $25/T | Increased Expenditure per farm* @ $125/T | Carbon Emissions T $CO_2$-e |
|---|---|---|---|
| 2009 + Fuel | 505 | 2,525 | 20 |
| 2010 + Electricity | 305 | 1,525 | 12 |
| 2013-2018 + Livestock & Fertiliser. | 3,936 | 19,680 | 158 |
| **2030 = Full effect** | **40,225** | **201,125** | **1,609** |
| % of Expenditure | 24% | 117% | |
| Net Profit 10 year av. | -62% | No Industry….? | |

*Figures rounded to nearest 100
Source: Meat & Wool New Zealand Economic Service

**What about other downstream & upstream effects?**

- **Cartage** - **Animal Health** - **Rates** **-etc**

# Farm Type Analysis

- Extensive Farms:
  - High GHG per output (Lower Productivity)
  - Larger Businesses = Larger Carbon liability
  - 30% of expenditure
  - Negative 10 year av. Profit at $25/T

- Intensive Farms:
  - Lower GHG per output (Higher Productivity)
  - Smaller Businesses = Smaller Carbon liability
  - 23% of expenditure

- At $60/T all Farm Classes in negative 10 year av. profit
- Mitigation technology needs to be **very low cost** to be viable

# Thinking Points

- **How do policies address two ethical judgements about the future?**
  > Climate Change Vs. Food Security
  > Market Forces of an ETS Vs. Other Regulatory Measures

- "BALANCING" Approach
  > Reduce emissions up to the point where the marginal benefit of additional reduction equals the marginal cost of additional reduction.

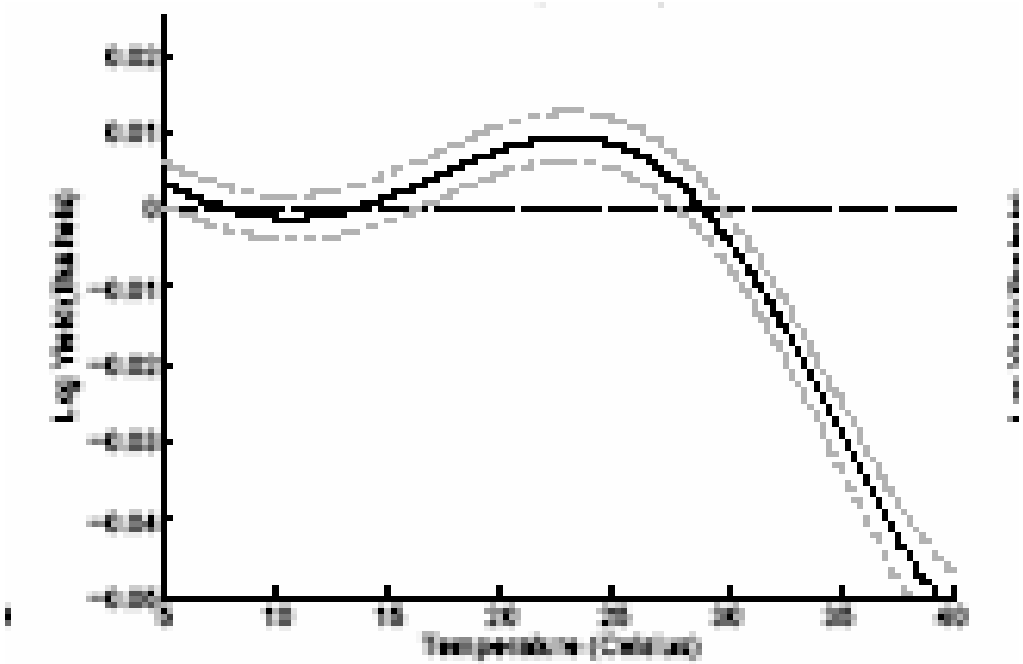
- "IMPERATIVE" Approach
  > The view that there is a sharp threshold effect, whereby marginal damage increases sharply once concentration passes a certain level.

- The choice of a discount rate to apply to climate policy & agricultural emissions is in part an ethical judgment, not purely a matter of economics.

# Relation of Temperature &
## Crop Yield Schlenker & Roberts (2006)

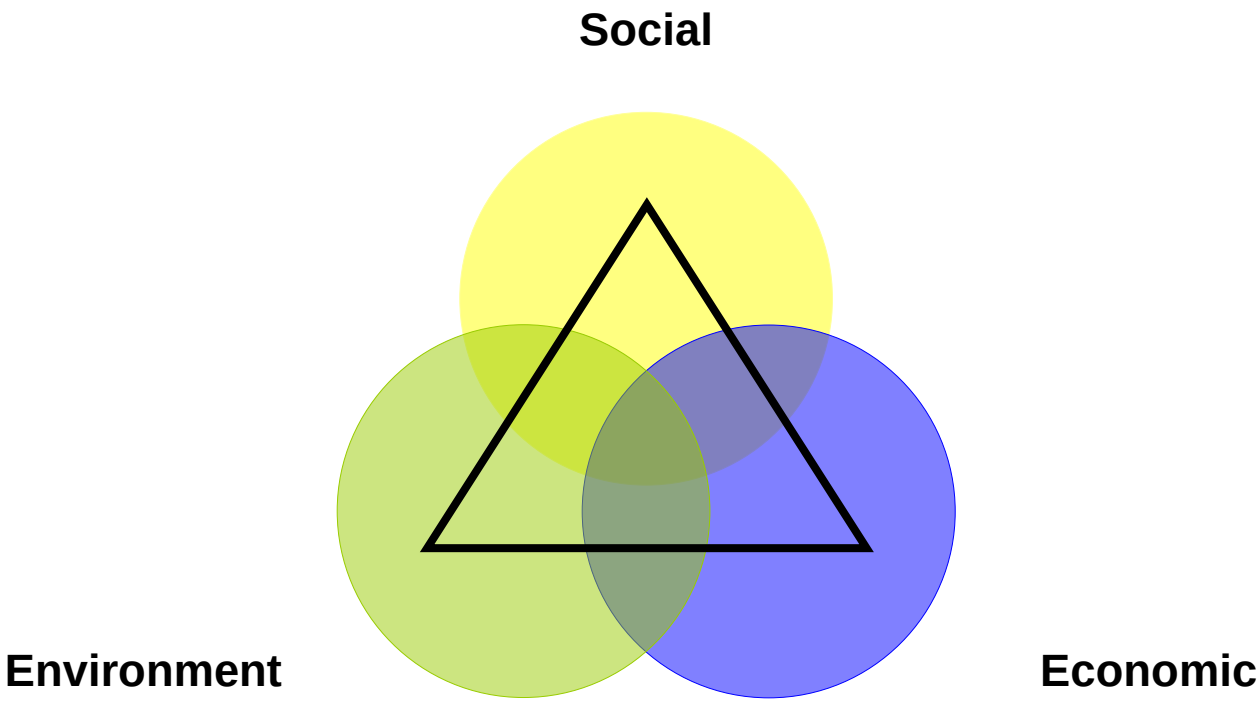
MEAT & WOOL
NEW ZEALAND

- Relationship is not symmetrical; it is distinctly asymmetric, fairly flat at first and then sharply declining beyond an upper threshold.



# Thinking Points

- **What are the other policy implications?**
  > Economy / NZ current account deficit / rural communities
  > Other Environment Indicators



# Wairoa Pastoral Sector - Example

**2007-08**

| | | |
|---|---|---|
| Number of Sheep and Beef Farms | | 186 |
| Number of Dairy Farms* | | 9 |
| | | |
| Number of Sheep | (000s) | 766 |
| Number of Beef Cattle | (000s) | 113 |
| Number of Deer | (000s) | 13 |
| Number of Dairy Cattle* | (000s) | 4 |

* 2005-06

Source: Meat & Wool New Zealand Economic Service
Livestock Improvement Corporation

# Pastoral Sector Economic Activity

Wairoa District 2008-09 f

| | Farm Gate $ m | Total Impact $ m |
|---|---|---|
| Sheep & Beef | 68.2 | 211.3 |
| Dairy | 7.3 | 29.3 |
| Region Total | $75.5m | $240.6m |
| | | |
| Per Capita in Region | $8,798 | $28,042 |

# Other Environment Impacts - Example

MEAT & WOOL
NEW ZEALAND

## HOW GREEN ARE BIOFUELS?

Biofuels are getting a bad rap as stories of rising food prices and shortages fill the news. But the environmental, energy and land use impacts of the crops used to make the fuels vary dramatically. Current fuel sources – corn, soybeans and canola – are more harmful than alternatives that are under development.

| FUEL SOURCES | | GREENHOUSE GAS EMISSIONS* Kilograms of carbon dioxide created per mega joule of energy produced | USE OF RESOURCES DURING GROWING, HARVESTING AND REFINING OF FUEL | | | | PERCENT OF EXISTING U.S. CROP LAND NEEDED TO PRODUCE ENOUGH FUEL TO MEET HALF OF U.S. DEMAND | PROS AND CONS |
|---|---|---|---|---|---|---|---|---|
| CROP | USED TO PRODUCE | | WATER | FERTILIZER | PESTICIDE | ENERGY | | |
| Corn | Ethanol | 81-85 | high | high | high | high | 157%-262% | Technology ready and relatively cheap, reduces food supply |
| Sugar cane | Ethanol | 4-12 | high | high | med | med | 46-57 | Technology ready, limited as to where will grow |
| Switch grass | Ethanol | -24 | med-low | low | low | low | 60-108 | Won't compete with food crops, technology not ready |
| Wood residue | Ethanol, biodiesel | N/A | med | low | low | low | 150-250 | Uses timber waste and other debris, technology not fully ready |
| Soybeans | Biodiesel | 49 | high | low-med | med | med-low | 180-240 | Technology ready, reduces food supply |
| Rapeseed, canola | Biodiesel | 37 | high | med | med | med-low | 30 | Technology ready, reduces food supply |
| Algae | Biodiesel | -183 | med | low | low | high | 1-2 | Potential for huge production levels, technology not ready |

* Emissions produced during the growing, harvesting, refining and burning of fuel. Gasoline is 94, diesel is 83.

Source: Martha Groom, University of Washington; Elizabeth Gray, The Nature Conservancy; Patricia Townsend, University of Washington; as published in Conservation Biology

SEATTLE P-I

# Thinking Points

- **What are NZs comparative advantages and what will these be in the future?**

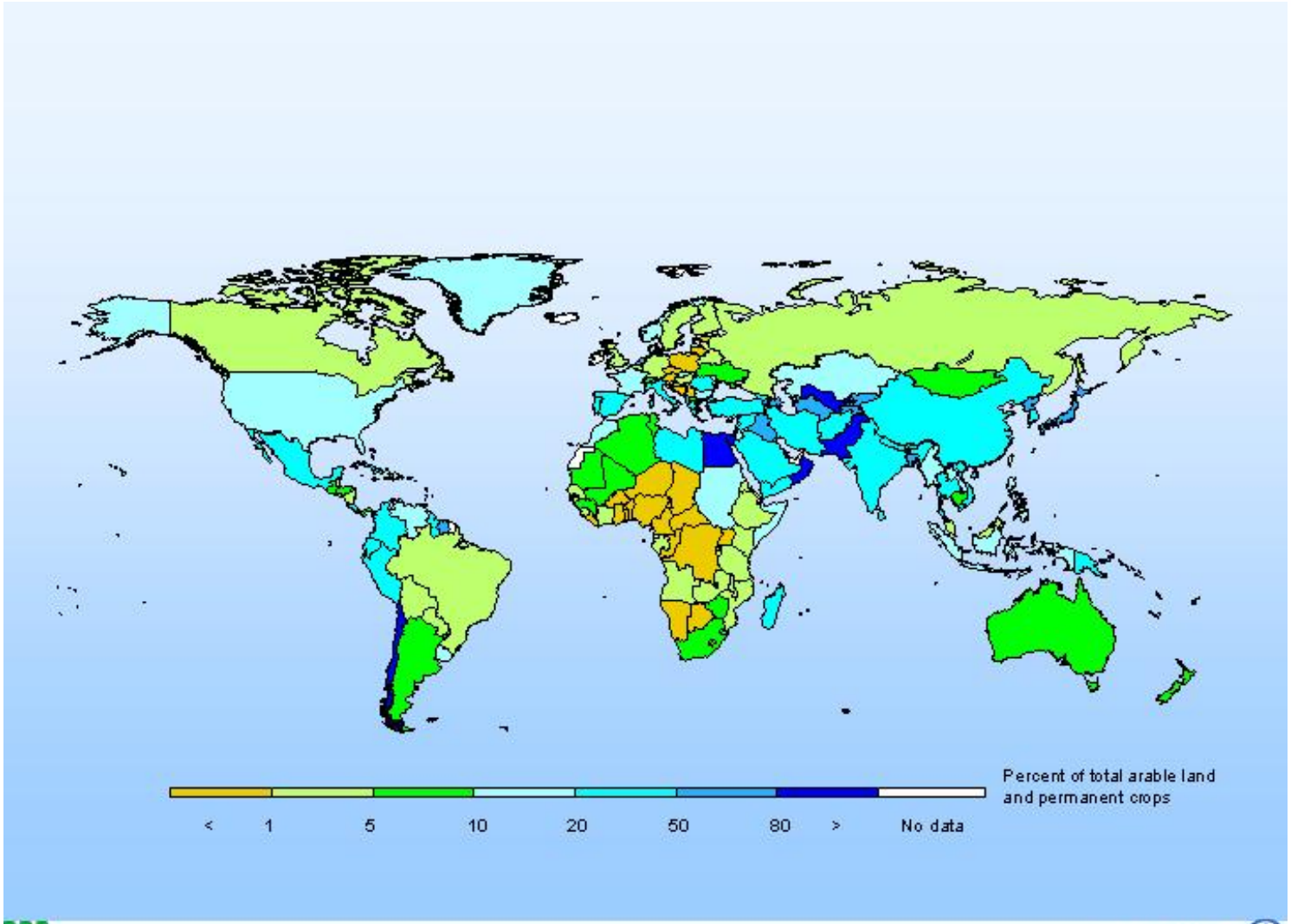
  > Climate change models look reasonably positive compared with most other countries.

  > Do you need to penalise one sector to promote NZs future comparative advantages in other sectors?

  > Industry refining supply chains and the way food is incorporated into the socio-cultural experience that defines food and its place in society.

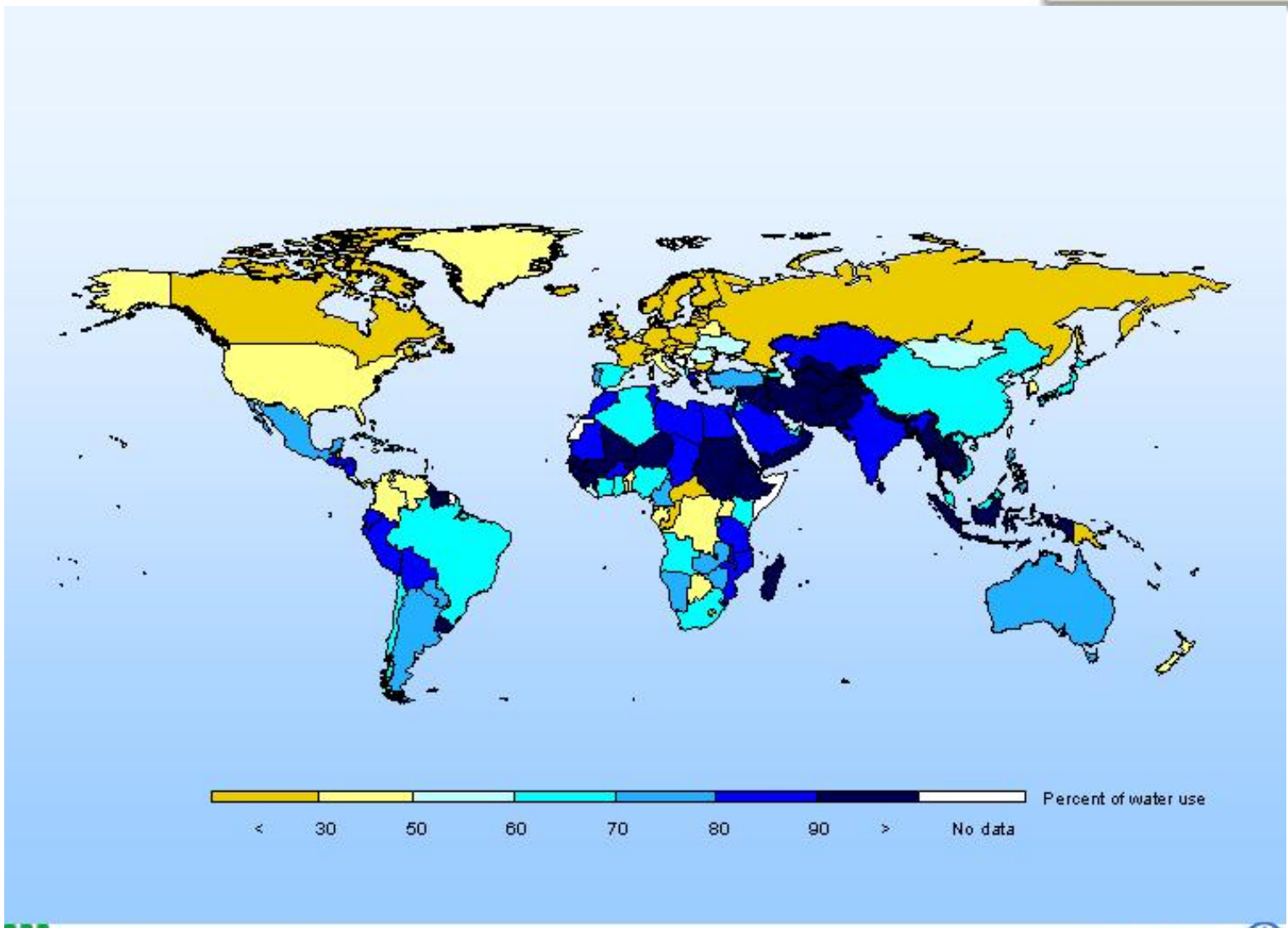
# Share of Irrigated Land in Arable

MEAT & WOOL
NEW ZEALAND



# Share of Agriculture in Water Use

MEAT & WOOL
NEW ZEALAND

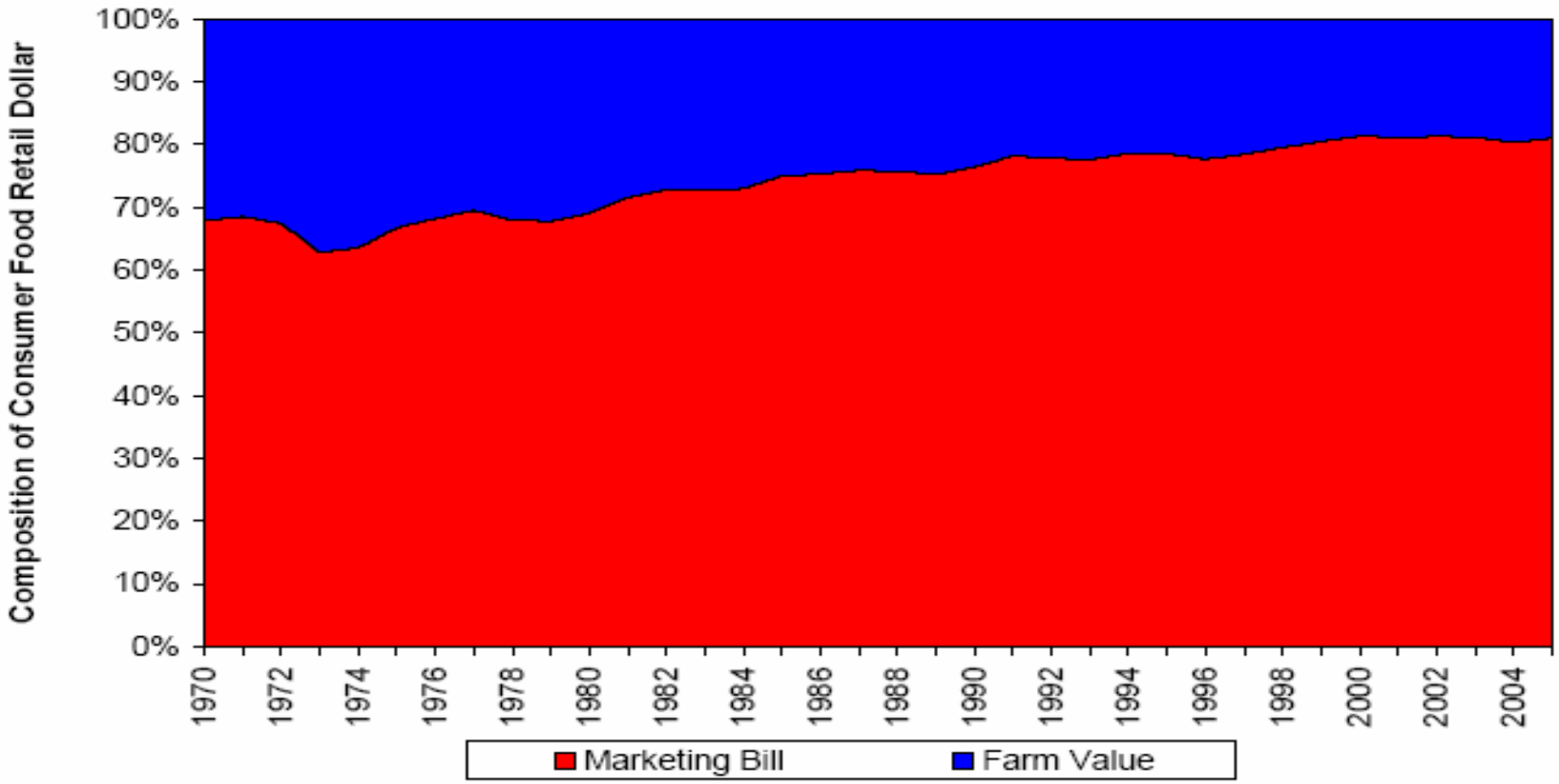


# Evolution of Food Dollar

in developed countries

MEAT & WOOL
NEW ZEALAND

**Figure 21: Evolution of the Food Dollar by Cost Component**




Source: USDA, Economic Research Service

# Thinking Points – Due Diligence

- Requires assessment and acknowledgement of the true costs and benefits of the proposed policies, with an emphasis on the:
  - Impacts on NZ's competitive advantage.
  - Emissions leakage offshore – GHG emissions is a global problem not local
  - Additional costs on producers both direct and in-direct, taking into account commodity prices.
  - Effects on rural communities.
  - Effect on economic position of NZ's pastoral industries and the wider NZ economy they underpin.

# Thinking Points – Steps to the Future

First Steps – Both industry and government

1. Back to investment in science and information collection to understand problem
2. Raise awareness in rural communities of the change they can create.
3. Provide investment certainty of fair and equitable treatment of Agricultural emissions – i.e. having **NO Regrets**

Second Steps – Both industry and government

1. Create policy that incentivises change rather that imposes costs. – This will create buy-in and acceptance by farmers and lead to sustainable policy outcomes
2. Investment in technology solutions that are economically and ethnically applicable to NZ pastoral systems and markets that are serviced.
3. Promote this to other Agricultural industries around the globe as a way forward.

# Material Supplied for Public use only by agreement from



Phone: 64 (0) 4 473 9150, Fax: 64 (0) 4 474 0801

e-mail: info@meatandwoolnz.com