# Effect of a carbon price on farm profitability on rainfed dairy farms in South West Victoria: A First Look

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# Outline

- Background- pasture-based feeding on dairy farms in South West Victoria
- Materials and Methods- two different feeding system, price on carbon, economic approach
- Results- comparing the operating profit and NPV of the systems
- Discussion
- Comments & Questions

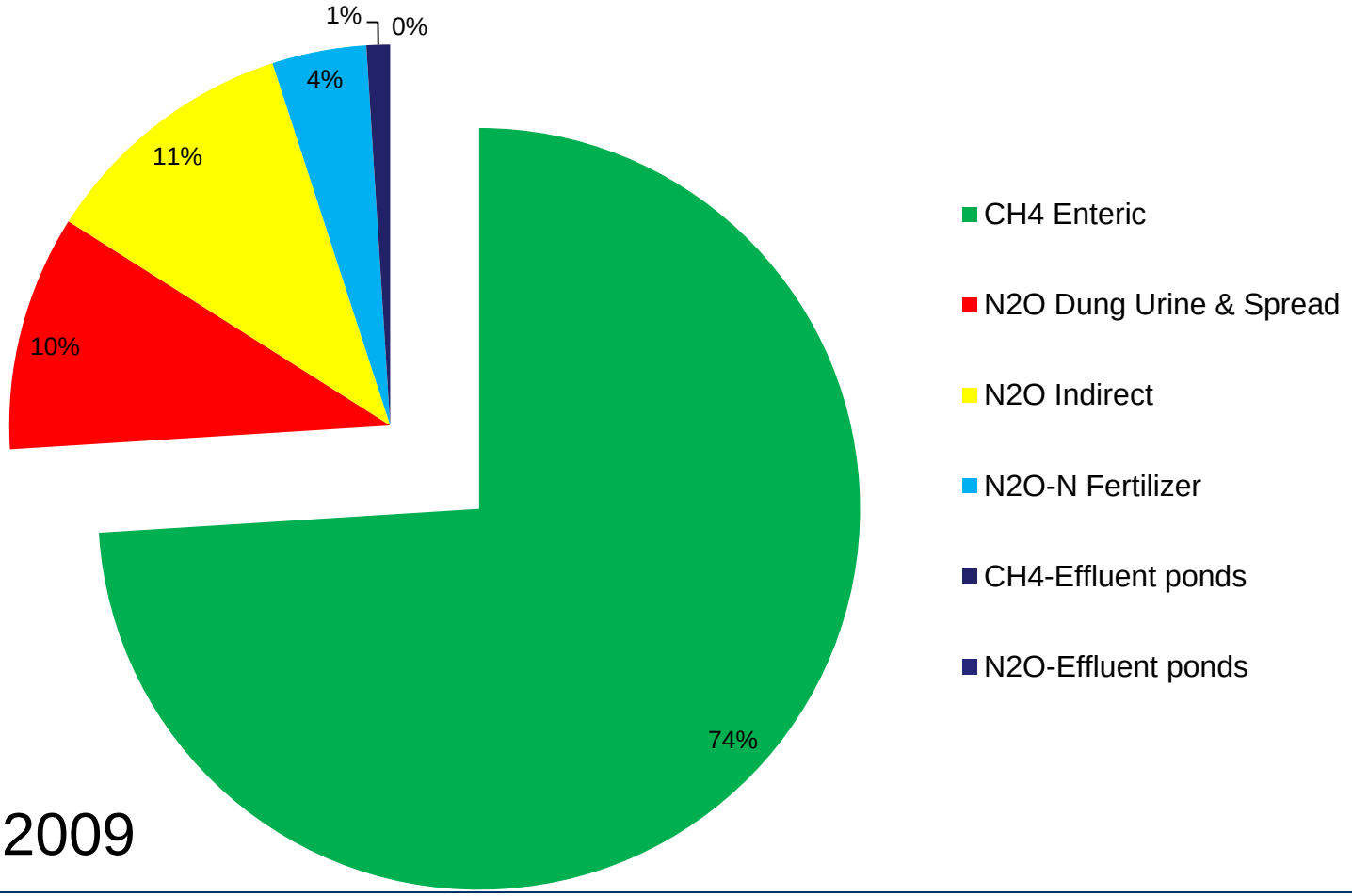
# Background

- Rainfed pasture feeding in SW Victoria

- Supplemented with bought-in feeds
- Calving
- Pasture deficits occur
- Apply different feeding systems

# Environmental impacts of changing the pasture-based

- GHG emissions




Eckard, 2009

# To reduce the GHG emissions

- Initiatives and policies
- CFI (2010), the most up-to-date mitigation policy
- Kyoto protocol- Australia to reduce its emissions.
- What if a price on carbon was imposed on agriculture?

# Data

- 5 year of farmlet study at Terang (2005-2009)
- Thirty-six Australian Friesian dairy cows
- 16 ha land
- 90% of grassland perennial ryegrass
- Modeling (Chapman et al. 2008a and b)

# Feeding systems examined

- Ryegrass max (RM) consisted of pasture and pasture products.
- Complementary forages (CF) provided extra feed by producing summer crop in summer and cereal silage in winter when the pasture availability was relatively lower.

# Representative farm characteristics

| Characteristics | Dairy farms in South West Victoria | Research Farm (DemoDairy) | |
|---|---|---|---|
| | | RM | CF |
| Average milk production (L/cow) | 6800* | 6070 | 6820 |
| Average milk production (kg MS/cow) | 503 | 449 | 499 |
| Average dairy area (ha) | 124 | 16 | 12.4 |
| Average herd size | 366 | 36 | 36 |
| Stocking rate (cows/ha) | | 2.25 | 2.9 |
| The estimated pasture consumption (t DM/ha) | 3-9 | 8.6 (Pasture plus pasture products) | 8.8 (Pasture plus pasture products) PLUS 3.2 double crop) |
| Concentrate feed supplemented (t DM/ha) | 0.8 | 1.18 (t DM/cow) | 1.45 (t DM/cow) |
| % of feed consumed purchased | 32 | 24 | 26 |

Doyle *et al.* 2000; DPI 2009; DPI 2010)

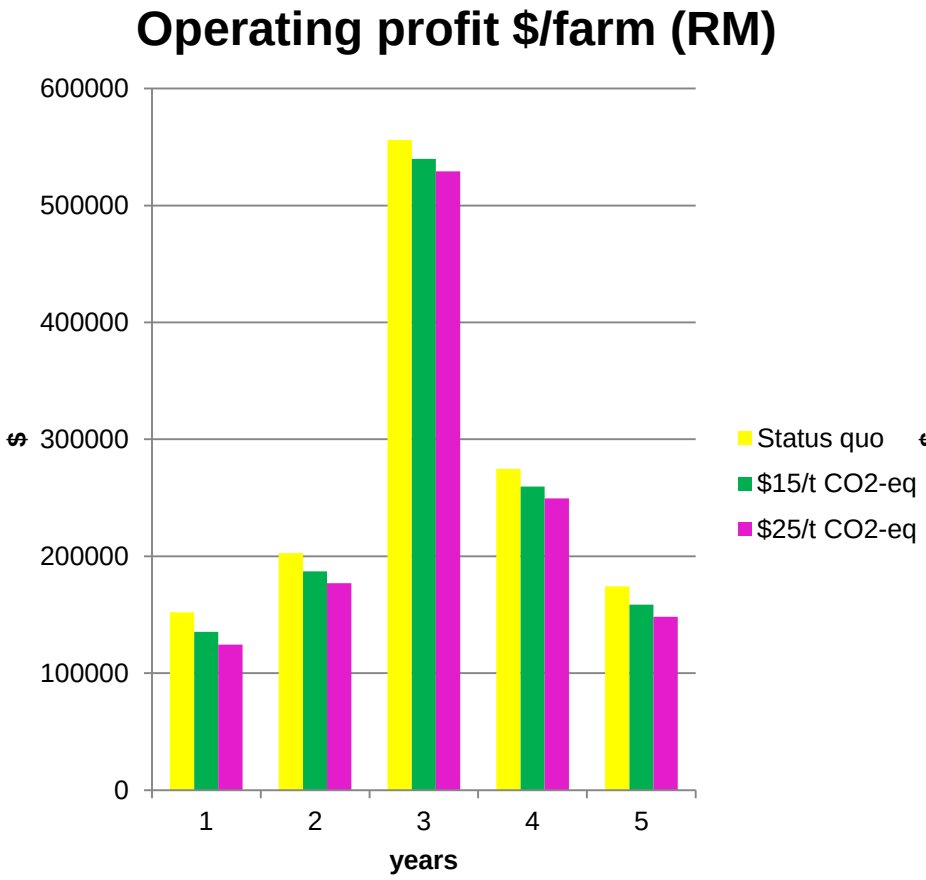
# Economic approach- A First Look

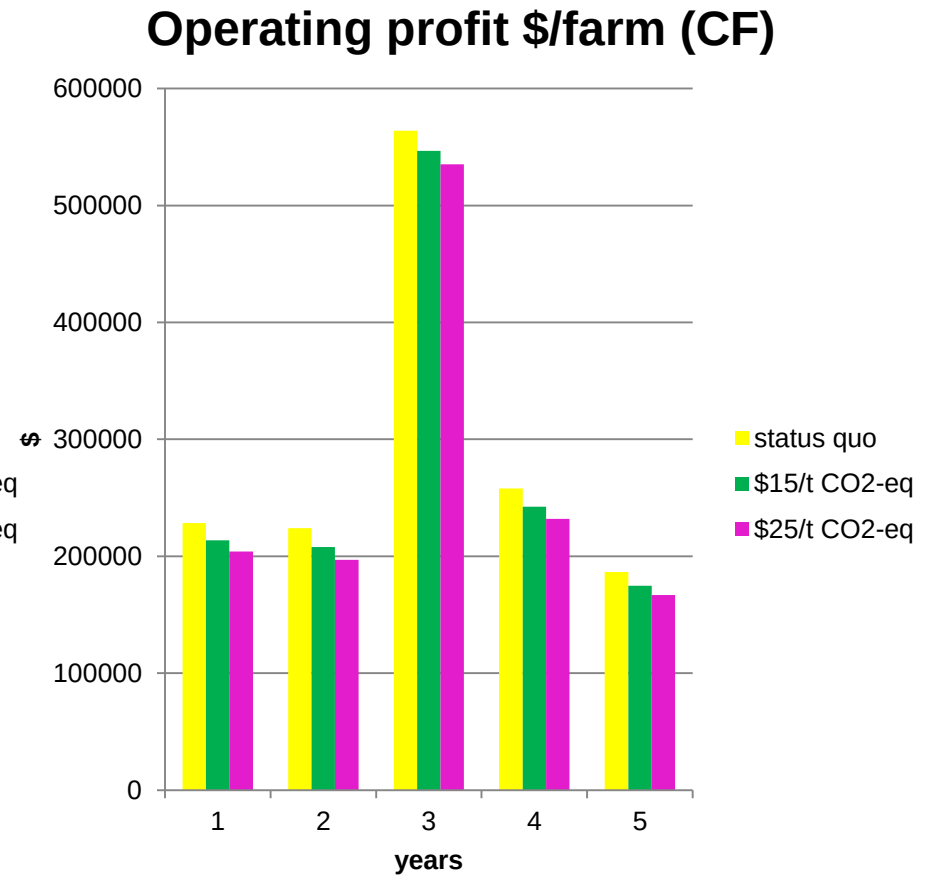
- Whole farm approach
- Carbon charge imposed
- \$15/t $CO_2$-eq and \$25/t $CO_2$-eq
- Variable feed and milk prices
- Operating profit calculated
- Net present value of operating profits at 5 % discount rate

# Results

- Operating profit reduced when a price on carbon was imposed and continued reducing as the price on carbon increased (e.g. from 15 to \$25/t $CO_2$-eq) compared to a *status quo* situation (no price on carbon was established).

# Operating profit reductions of the two systems




Notation on X axes is 1 – 5 where 1 = 2005 and 5 = 2009

# NPV reductions as opposed to change of carbon price

| | Status quo | | Rye Grass Max (RM) | | Complementary Forage (CF) | |
|---|---|---|---|---|---|---|
| years | RM | CF | $15/t CO2-eq | $25/t CO2-eq | $15/t CO2-eq | $25/t CO2-eq |
| 2005-06 | 152051 | 228348 | (-10.9%) | (-18.2%) | (-6.4%) | (-10.7%) |
| 2006-07 | 202753 | 224145 | (-7.7%) | (-12.8%) | (-7.3%) | (-12.2%) |
| 2007-08 | 555862 | 563903 | (-2.9%) | (-4.8%) | (-3.1%) | (-5.1%) |
| 2008-09 | 274777 | 258035 | (-5.5%) | (-9.2%) | (-6.1%) | (-10.1%) |
| 2009-10 | 174262 | 186621 | (-9.0%) | (-15.0%) | (-6.4%) | (-10.6%) |
| Net present value ($)* | 1171488 | 1266409 | (-5.9%) | (-9.8%) | (-5.2%) | (-8.7%) |

# Studies on Carbon charge in Agriculture

- NZ$25/t $CO_2$-eq increased the cost of dairy farmers by 5.9 per cent (Lennox *et al.* 2008).
- NZ$50/t $CO_2$-eq would reduce the dairy farmers' revenues by 11 per cent (Hendy *et al.* 2006).
- NZ$25/t $CO_2$-eq reduced the revenue of dairy farmers by 7 per cent (Hendy and Kerr 2005).

# Likely consequences of carbon charge as a direct cost to dairy farm business

- Reduced area
- Reduced stocking rates
- Changes in farm management to reduce emissions per animal
- Further indirect effects e.g. workers on the farm and other communities across the whole economy.
- Reducing/ converting the emitting land to forestry and/or moving land from dairy to sheep/beef.

# Future study opportunities

- Mitigation options
- Policy adaptation and application e.g. improving monitoring technologies.
- Economic efficiency measures require estimates of profit from whole systems.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