



# Flexible Feeding Systems

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DEPARTMENT OF  
PRIMARY INDUSTRIES

# Background

Prolonged drought/climate change

Less water (rainfall and irrigation)

Pasture lower proportion of cows' diet



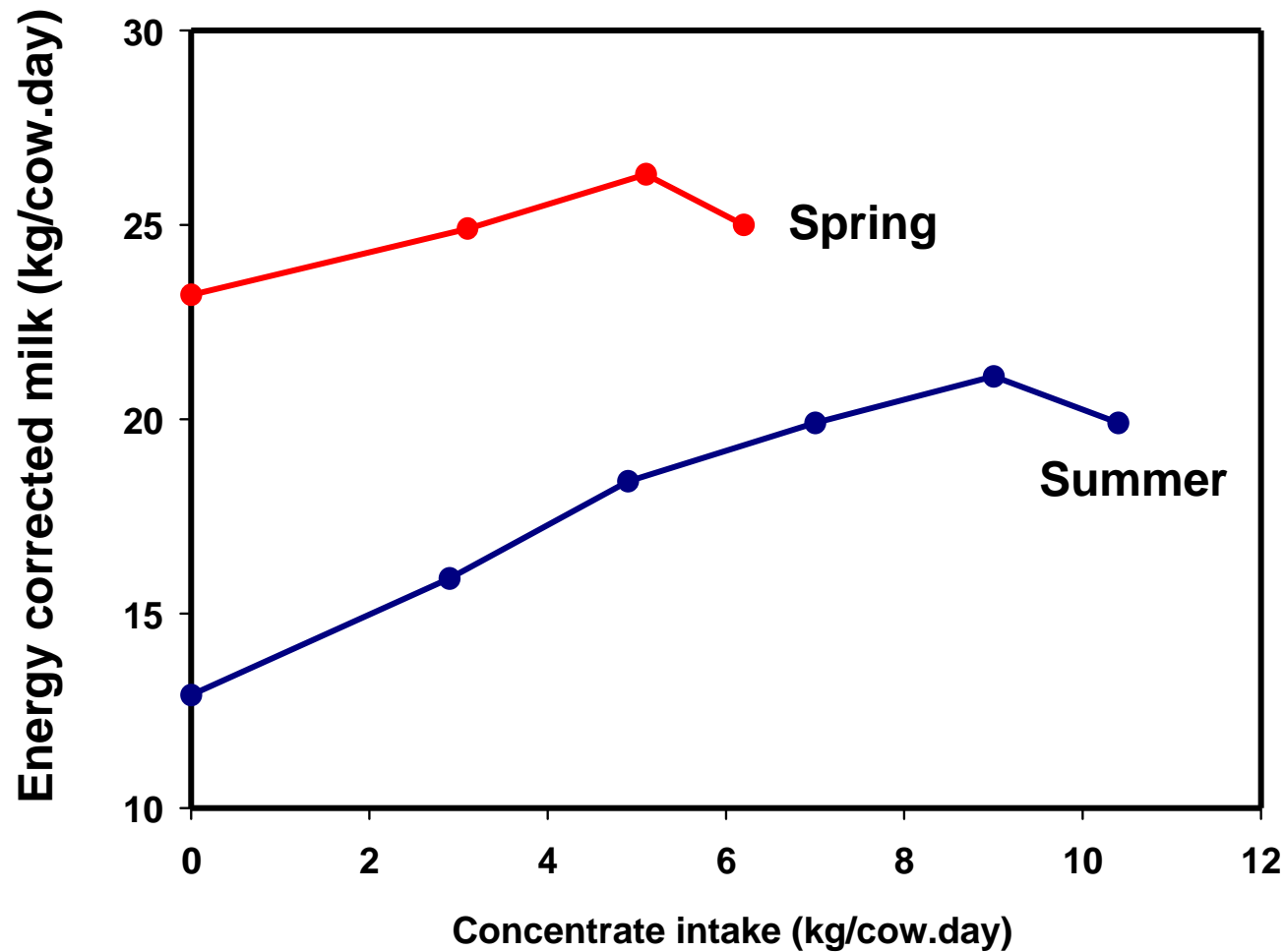
Pasture: Was 75% of diet,  
now less 50% some regions

# Flexible Feeding Systems

*AIM: Develop flexible and efficient feeding systems that cost effectively integrate supplementary nutrients into the diets of cows grazing pasture.*

**(Find better ways to feed supplements)**

# Milk responses to concentrates in the bail



Doyle & Stockdale 2006; Walker *et al.* 2001

# Partial mixed rations (PMR)

*“Total mixed rations incorporated into grazing systems”*

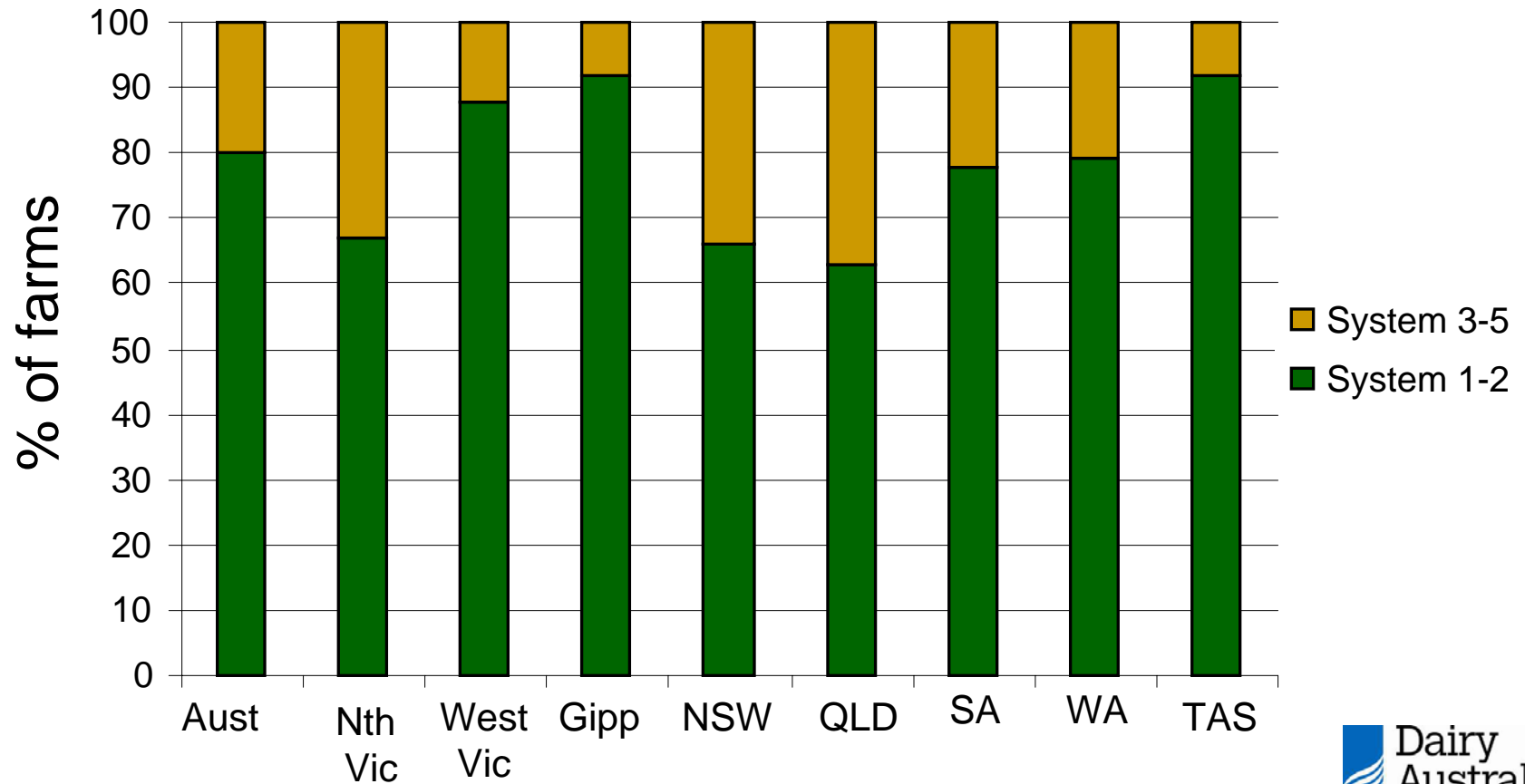


# Feeding system categories

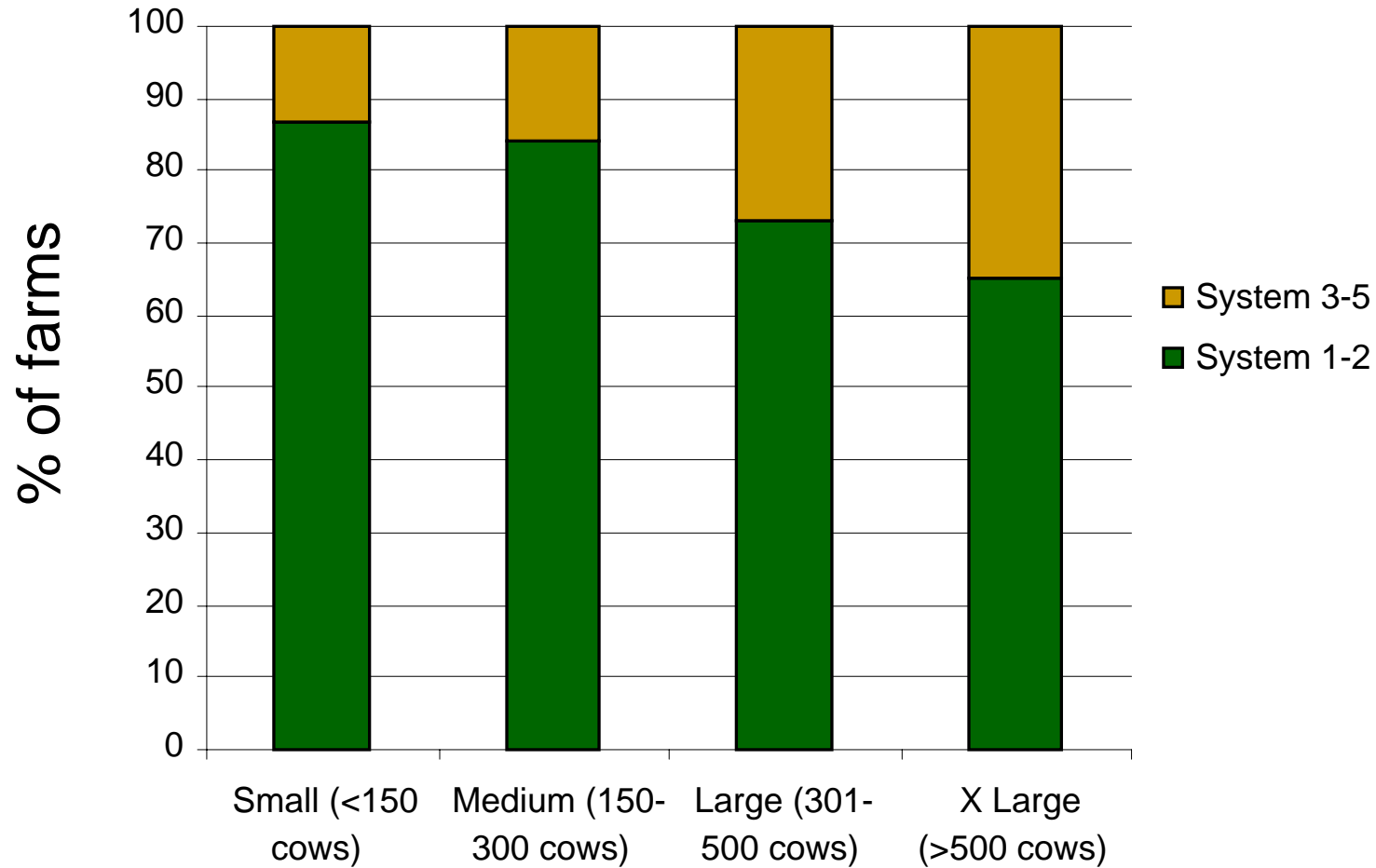
- 1. Low bail** - Grazed pasture, < 1.0t grain in dairy
- 2. Mod.- High bail** - Grazed pasture, > 1.0t grain in dairy
- 3. PMR** - Grazed pasture all year, PMR on feed pad
- 4. Hybrid** - Grazed pasture < 9 mths + PMR on feed pad
- 5. TMR** - (total mixed ration)- Zero grazing. Cows confined and fed TMR



# Region by feeding system



# Larger herds favour systems 3 to 5



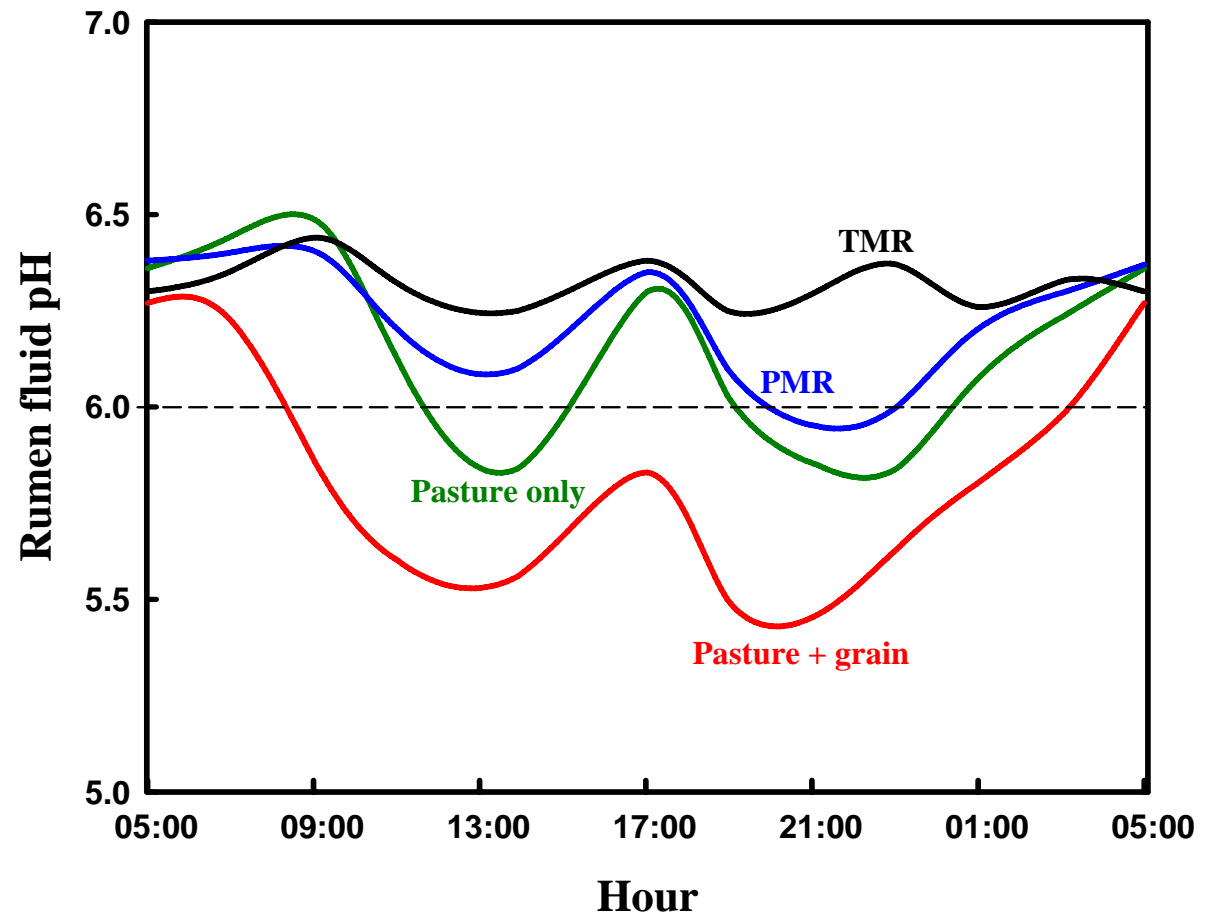
# Grazing vs mixed ration feeding

	<b>System 2</b>	<b>System 3</b>	<b>System 5</b>
	Pasture + concentrate	Partial mixed ration	Total mixed Ration
Dry Matter	21.6	25.2	26.7
Pasture Dry Matter	12.9	7.5	-
Milk yield	28.5	32.0	38.1
Energy Corrected Milk yield	24.2	28.3	33.6
FCE (kg ECM/kg DM)	1.12	1.12	1.26

Bargo *et al.* 2002

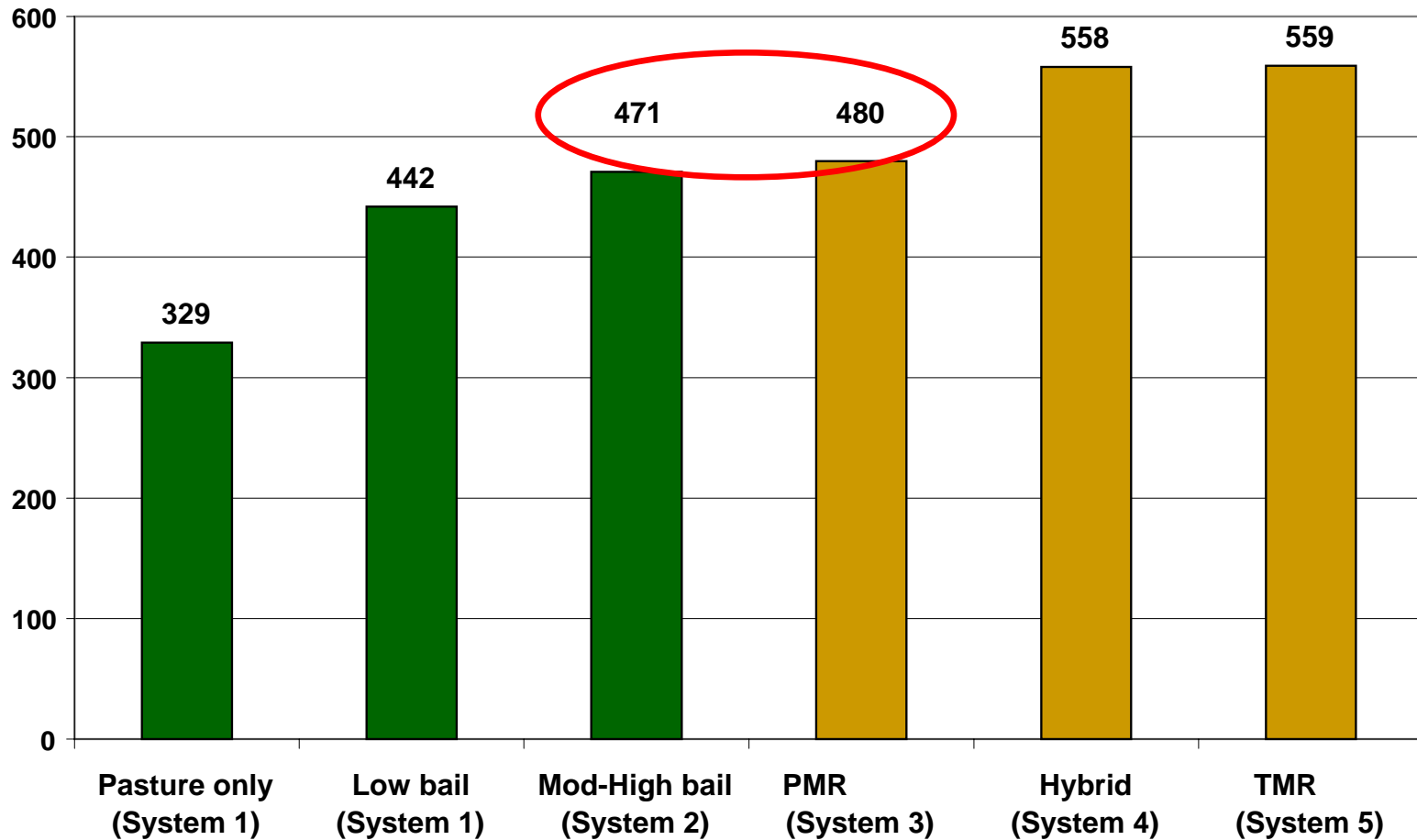


# Rumen pH in different feeding systems



# Milk solids production by system

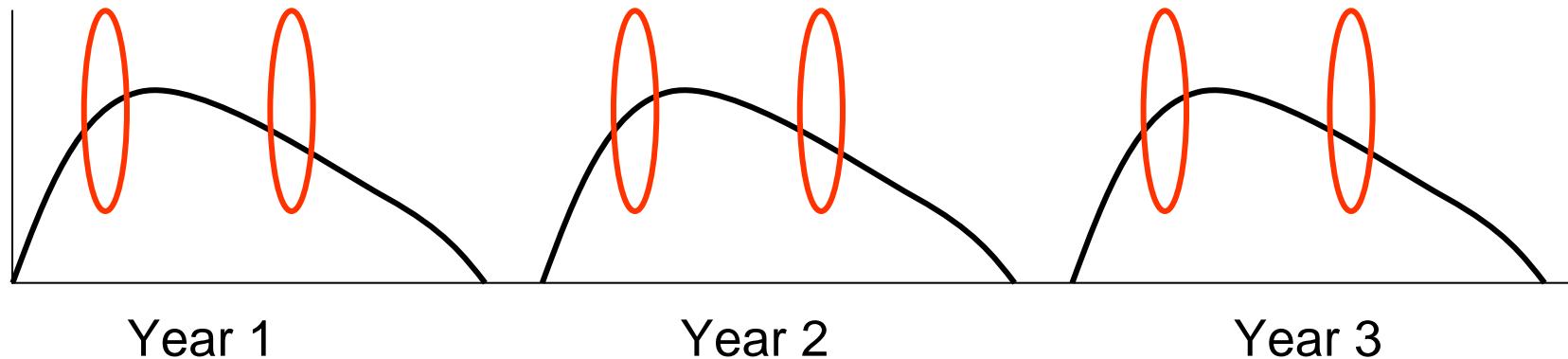
(kg MS/cow/year)



Dairy Australia Nat. Dairy Farmer Survey, 2010

# Flexible Feeding Systems Project

*Both long and short term experiments*



- **Production issues**
- **Underlying mechanisms**

# Method - diets

**Control: Barley grain, pasture silage**  
**Fed in bail and paddock**

**PMR: Lucerne hay, maize grain,**  
**maize silage, barley grain**  
**Fed on feedpad**

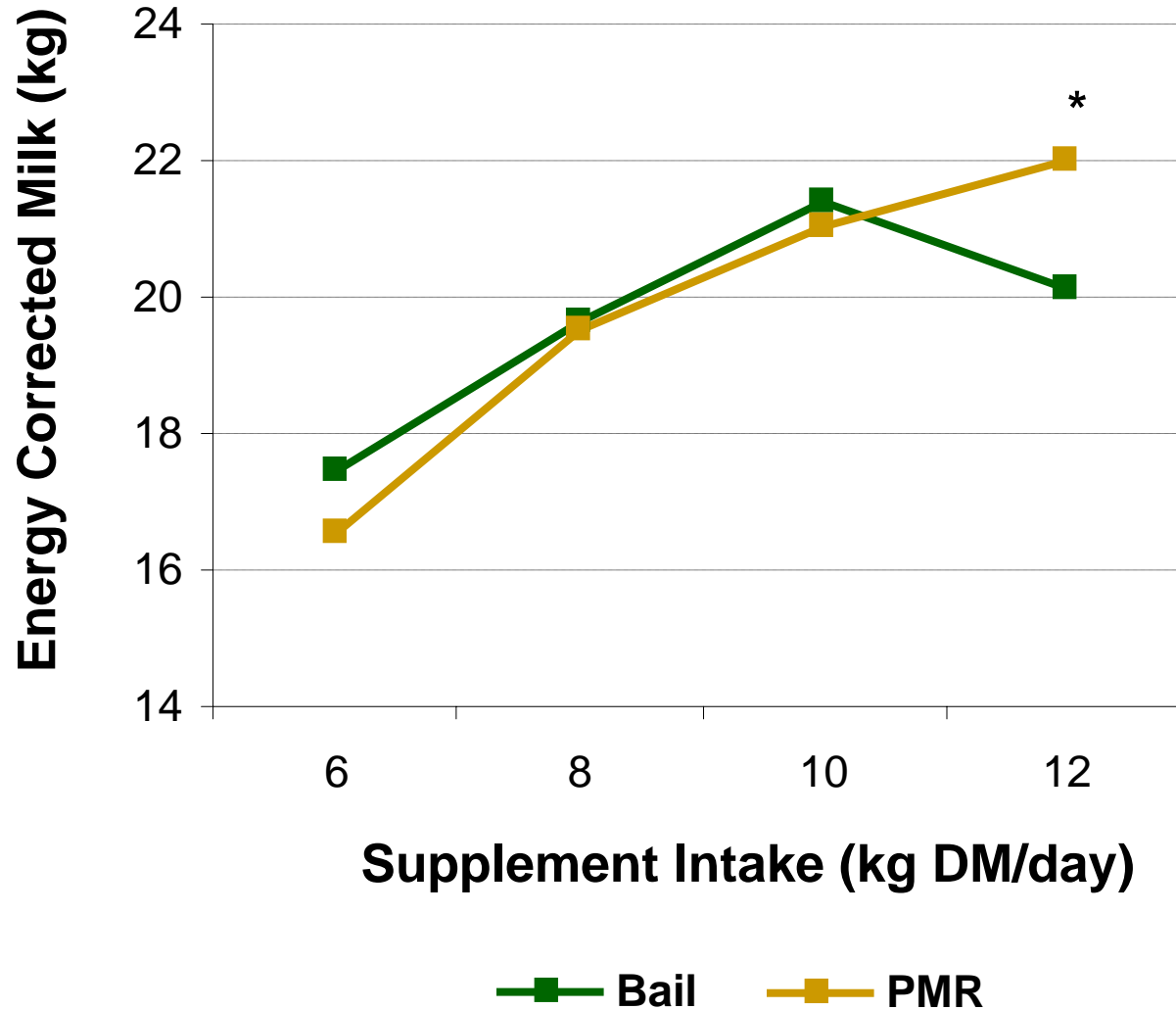


# Method (cont'd)

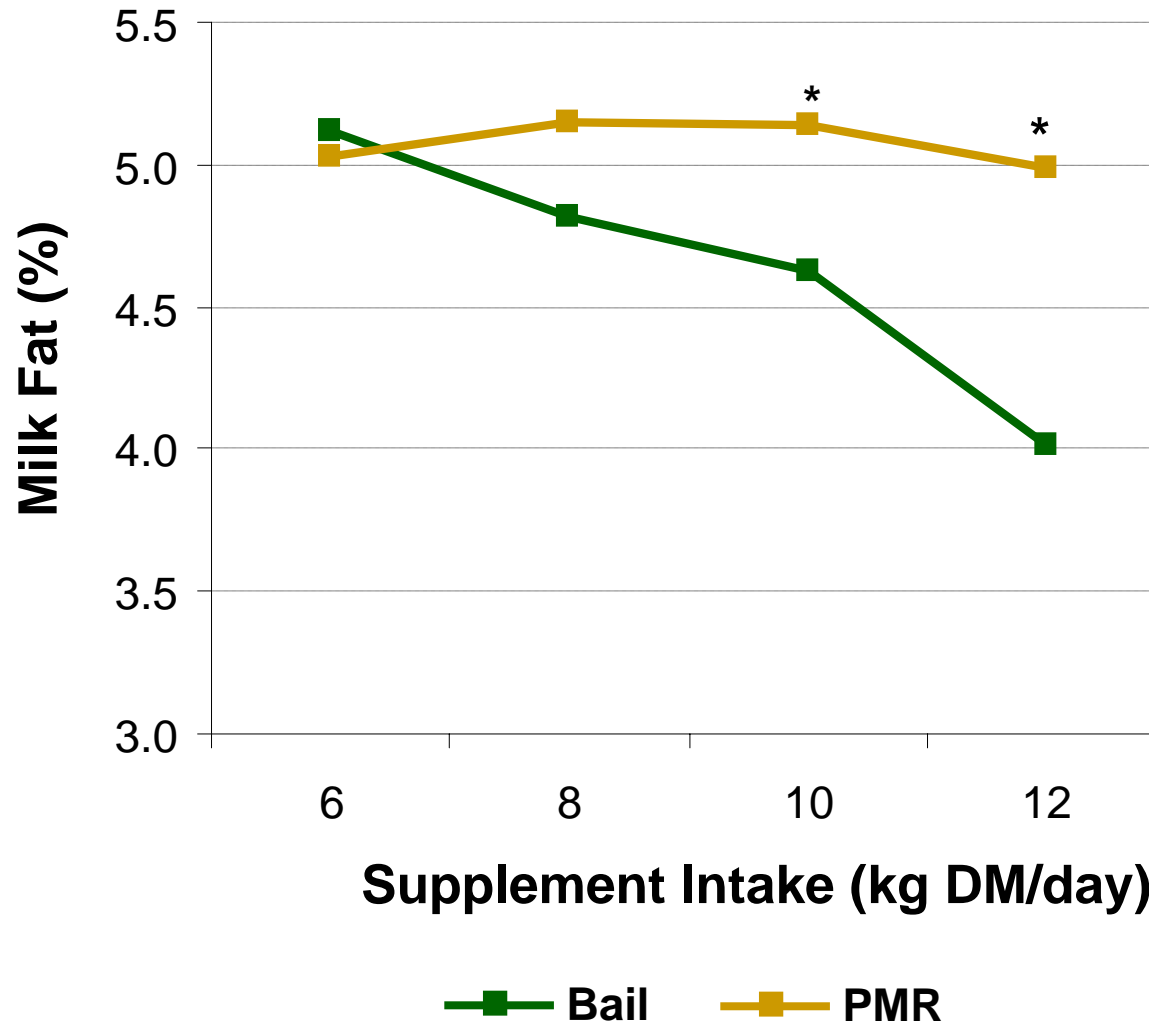
- *All diets isoenergetic*
- *216 cows*
- *Supplement fed at 6, 8, 10 & 12 kg/cow.d*
- *Pasture intake 8 kg/cow.d, all groups*



# Milk yield responses

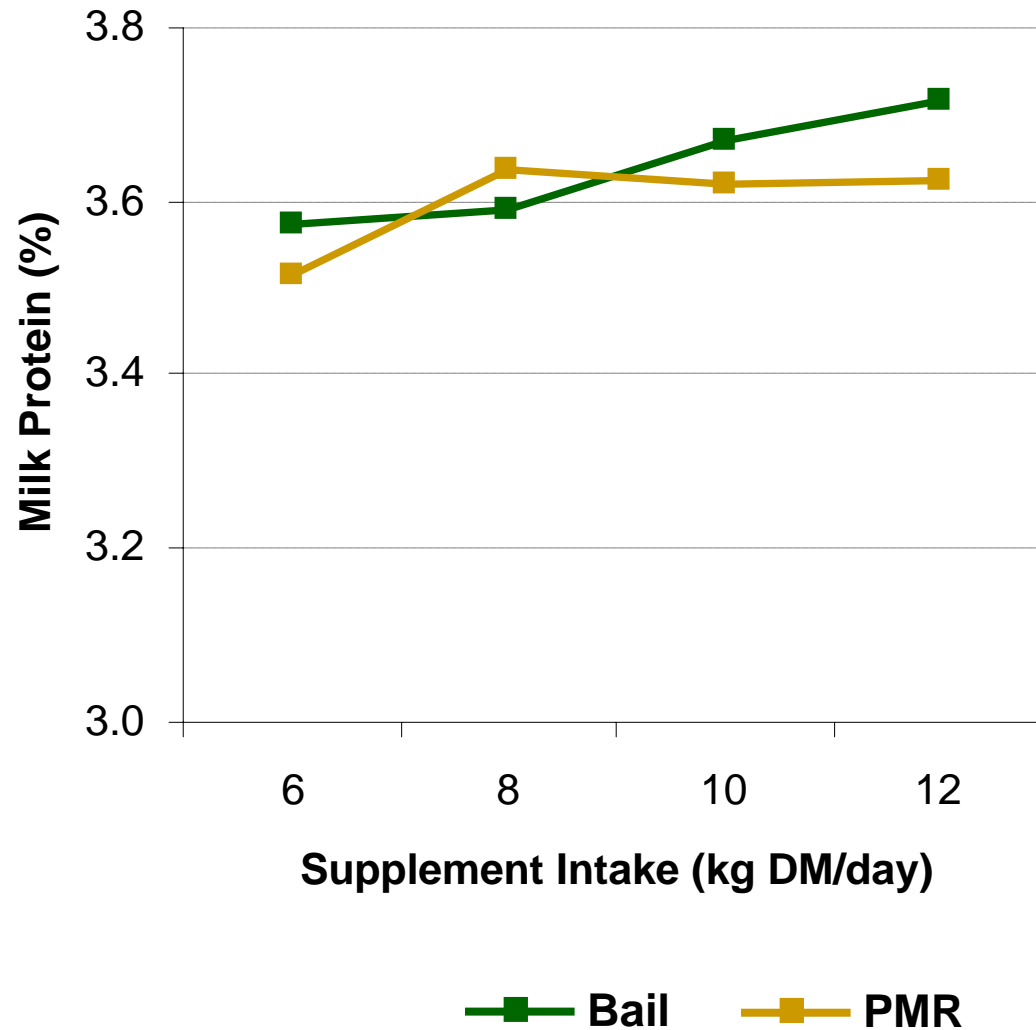


# Milk fat % responses

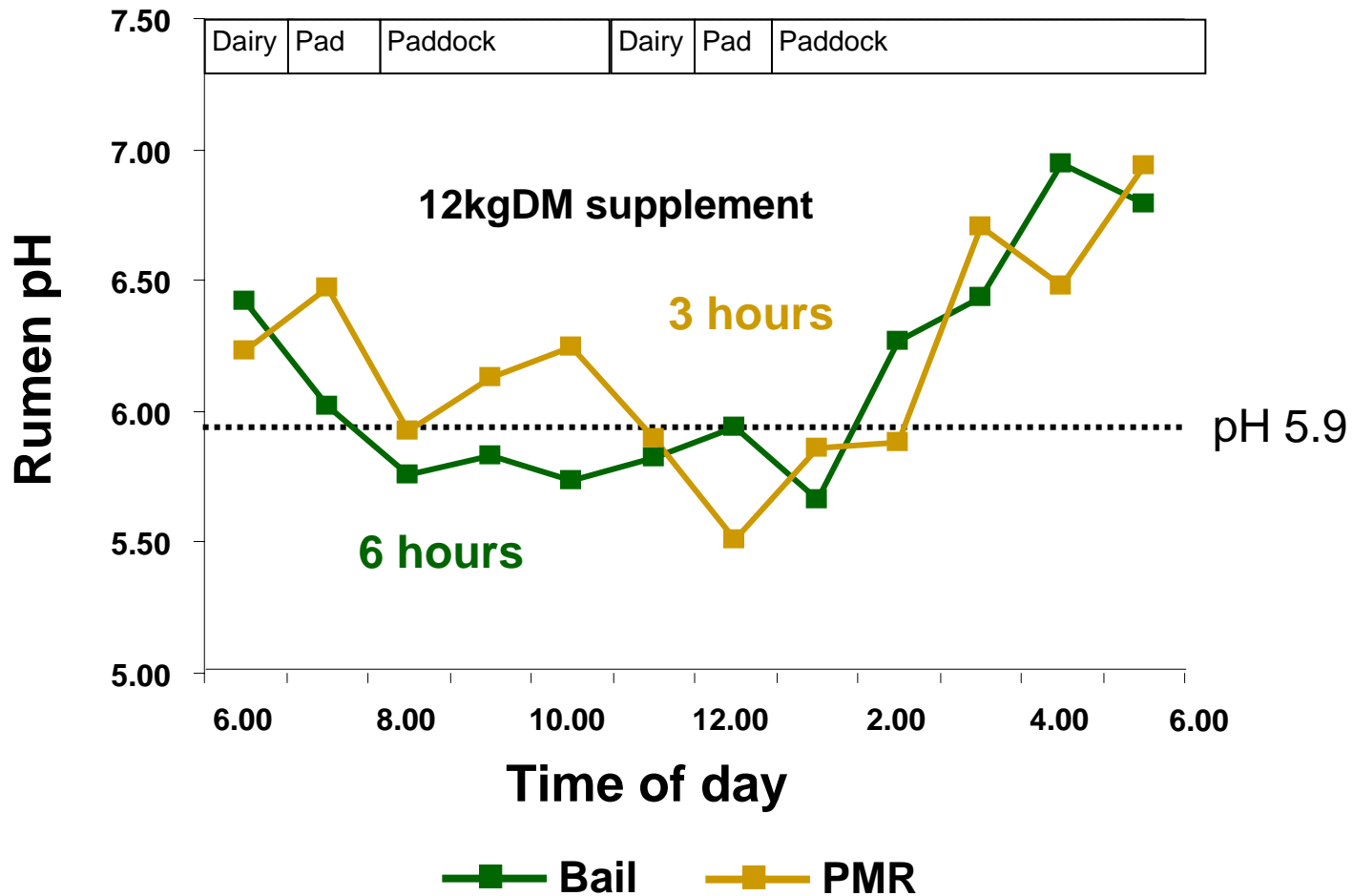


\*  $P < 0.05$

# Milk protein % responses



# Rumen pH -Autumn 2010



# Messages from year 1




- **Need 2 x daily feeding**
- **No difference until >10kgDM supplement/cow.d**
- **Simple mix didn't cut it**
- **Complex PMR was 'better' – slowly digestible?**

# Future directions

- **Response at higher rates of supplement (13.5kg/cow/d)**
- **Focus on complex mix**
- **Digestibility studies**
- **Milk processing properties**



# Governance

- **Investor Steering Committee** (DPI, DA, GGF, UDV)
- **Farmer Steering Committee** (NVic, Riv, SW, Gipps)
- **Nutrition Advisory Group**  Dairy Australia  
Your Levy at Work
- **Pre-schedule Process**
- **Animal Ethics Committee**

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# Is it profitable? Case study farms

	Farm 1	Farm 2
Irrigated areas	40 ha perennials	40 ha perennials 97 ha annuals 28 ha lucerne
Water right (HRWS)	340 ML	880 ML
Herd	165	390
Calving pattern	Spring	Split
Milk production	5,900 L/cow 260 kg BF/cow 200 kg protein/cow	8,930 L/cow 355 kg BF/cow 294 kg protein/cow
Grain (t DM/cow)	1.6	2.3
Purchased hay (t DM/cow)	0.7	1.0

C.Ho,  
PhD, 2010

# Medium climate change conditions

Feeding System	Farm 1	Farm 2
Grain & hay	2.2%	2.8%
Grain & hay (inc prodn)	2.6%	1.9%
PMR	2.4%	5.8%
PMR (inc prodn)	3.3%	6.7%

- ◆ Both farms unprofitable using grain and hay feeding system
- ◆ PMR feeding increased profit, but only farm 2 met 5% target

C. Ho, PhD, 2010

# Water allocation scenarios

