EAAP 2007. Session P, N, Ph 32.7

# Factors affecting voluntary feed intake (VFI) in the lactating sow

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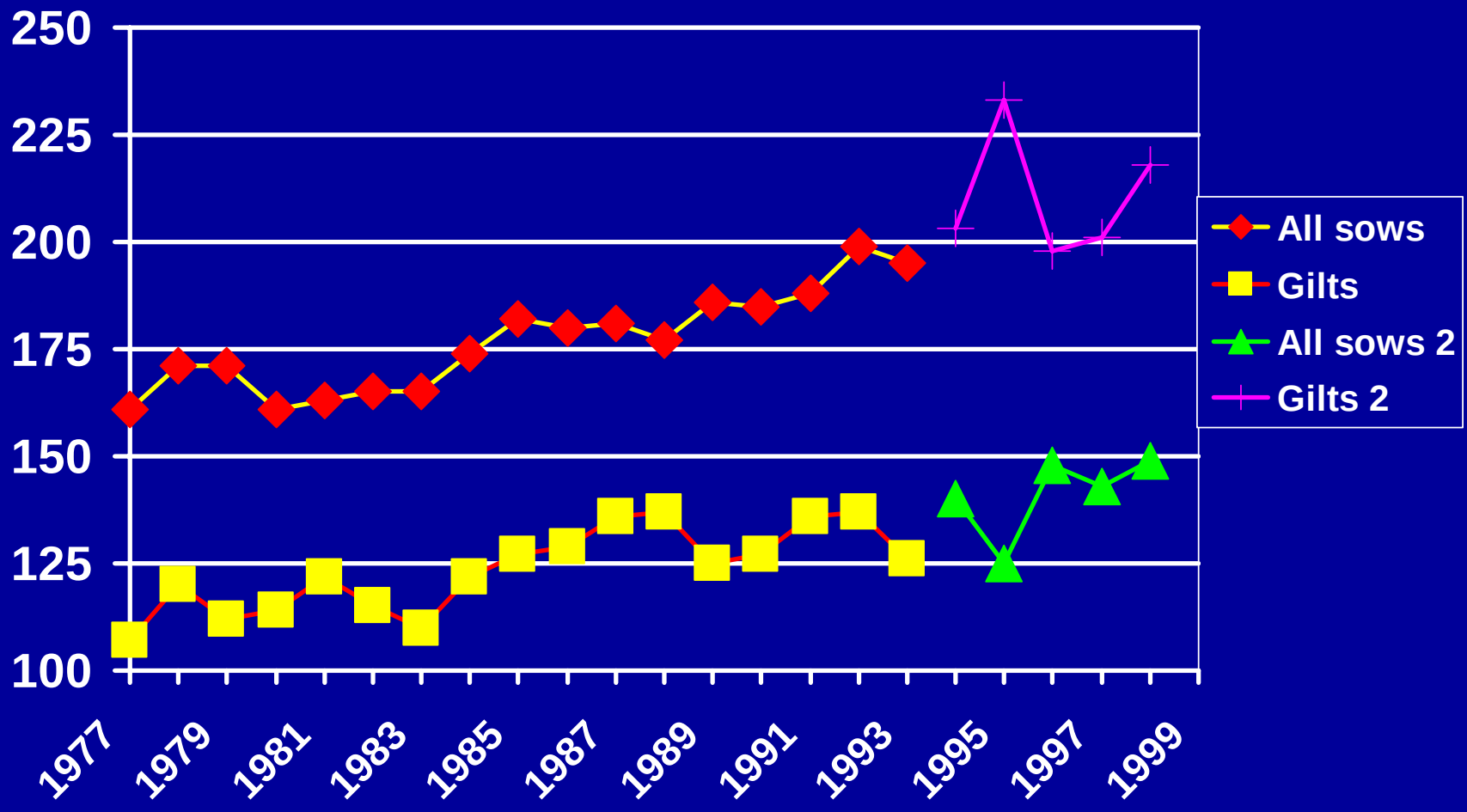
# Trends in sow productivity in France

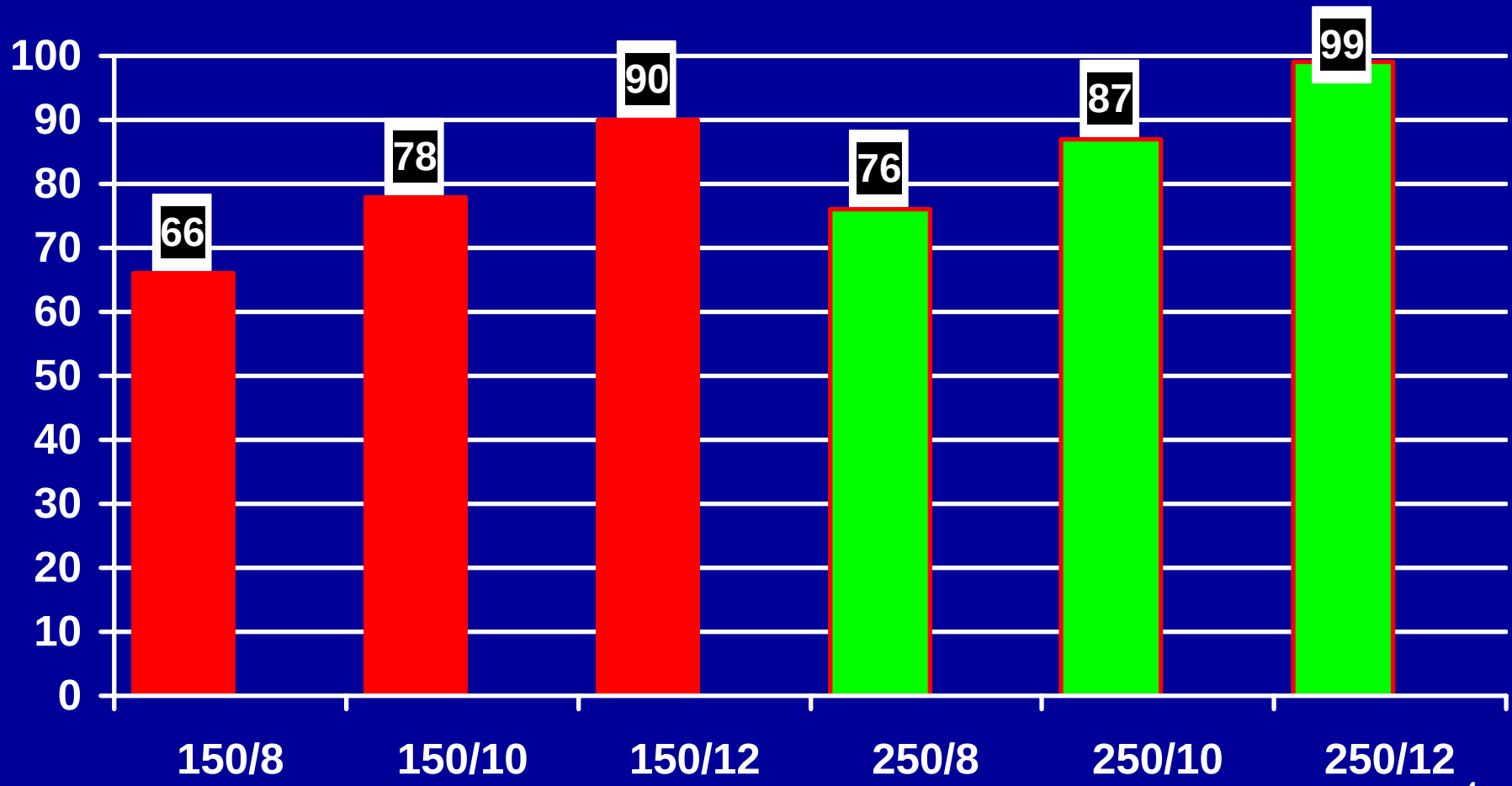
| | 1971 | 1997 | 2007 |
|---|---|---|---|
| No born | 10.8 | 11.3 | 12.7 |
| Litters/sow/yr | 2.0 | 2.2 | 2.4 |
| Pigs/sow/yr* | 16.7 | 21.5 | 26.8 |

Per productive sow in herd

# Trends in sow weight at mating in Moorepark herd 1977 to 1999, kg



# Estimated energy requirement of lactating sows, DE MJ/d




NRC 1998

# Sow milk production

- Milk production is driven by litter demand and nutrients available
- Each extra pig from birth to 7.5 kg at weaning needs 12 to 16kg sow feed
- Low feed intake can inhibit milk output but high intake may not stimulate milk output leading instead to increased sow weight

# Low feed intake in lactation results in …

- Loss of sow body weight (fat and lean)
- Lower litter weaning weight
- Increased W-O interval
- More anoestrus sows
- Lower ovulation
- Poorer conception
- Higher embryonic mortality
- Higher culling



Eissen, 2000

# Sow factors affecting VFI in lactating sows

- Genotype
- Parity
- Body weight
- Body condition
- Pregnancy feed level
- Litter size
- Stage and length of lactation
- Health

# Some of these factors are correlated

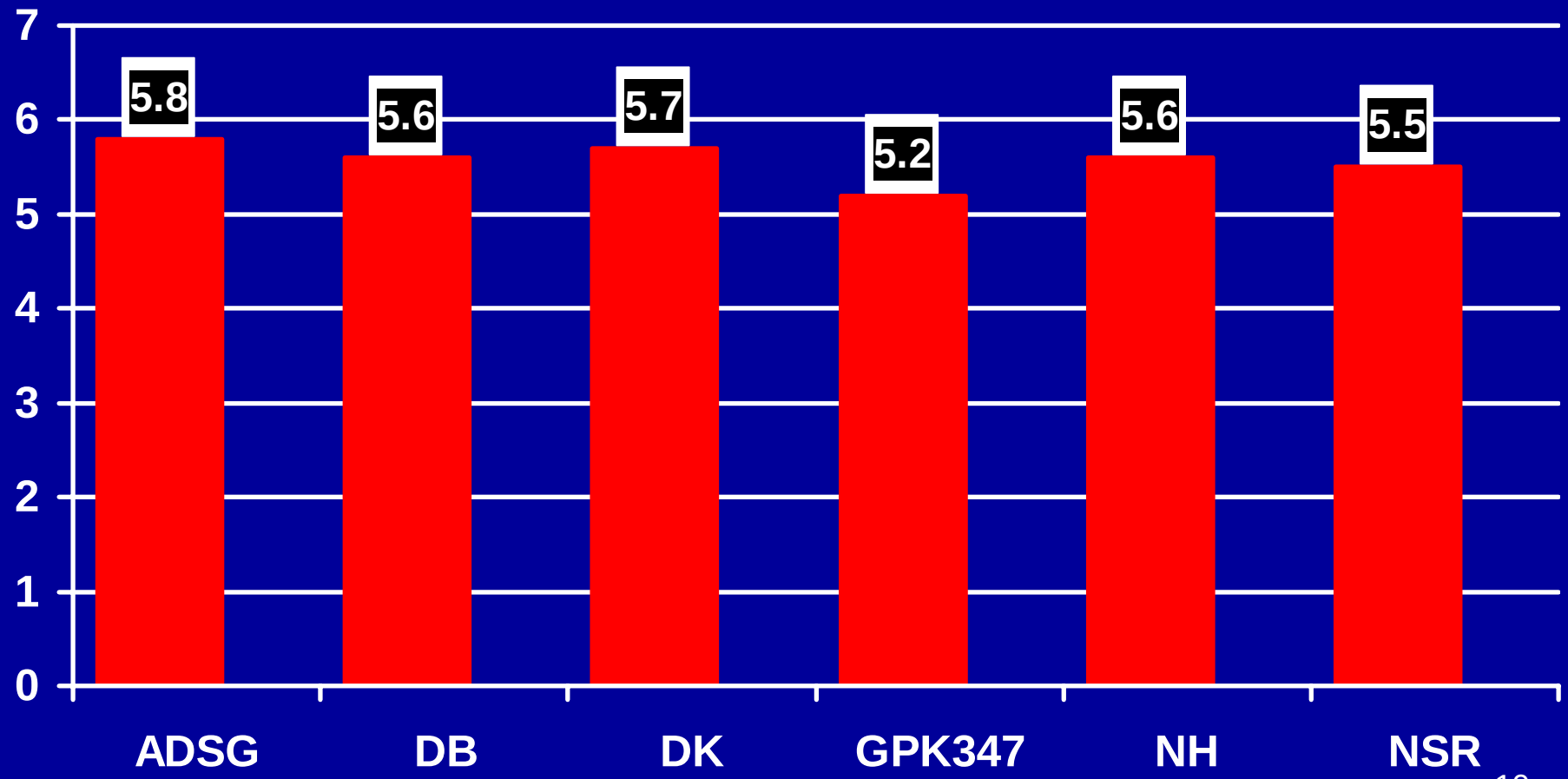
- Genotype with body weight, body fatness and litter size
- Parity with litter size, body weight and condition
- Pregnancy feed level with body weight and condition
- Body weight, body size and fatness with ease of lying/standing

# Genotype and VFI in lactating sows

- Genetic influence on VFI is complex
- Sows from breeding lines selected for low feed intake during growth eat less in lactation
- Sows which are lean at farrowing relative to their "natural or potential" body fatness tend to eat more

Kerr and Cameron, 1996

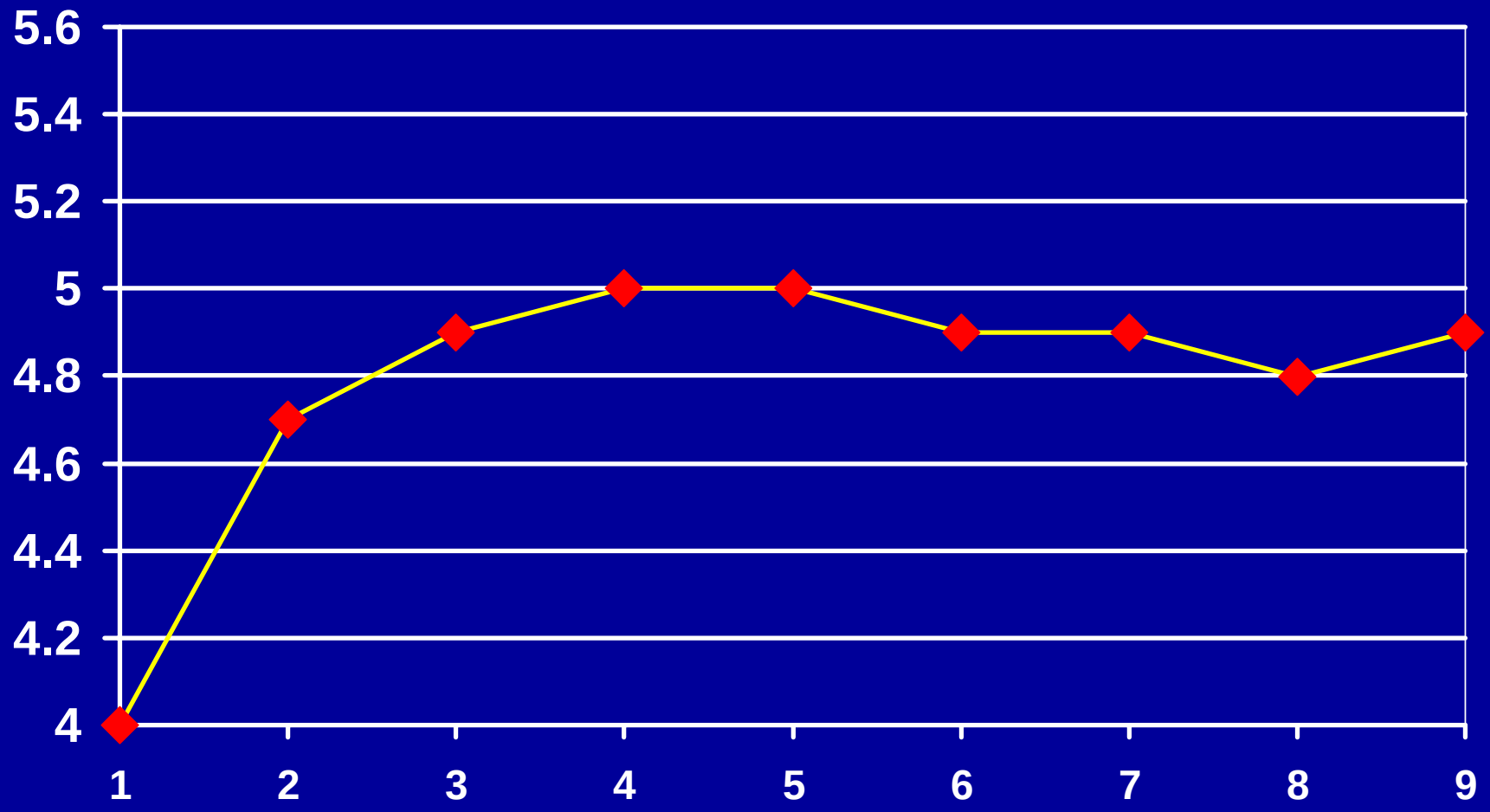
# VFI of six maternal lines, kg/d




Moeller et al, 2004

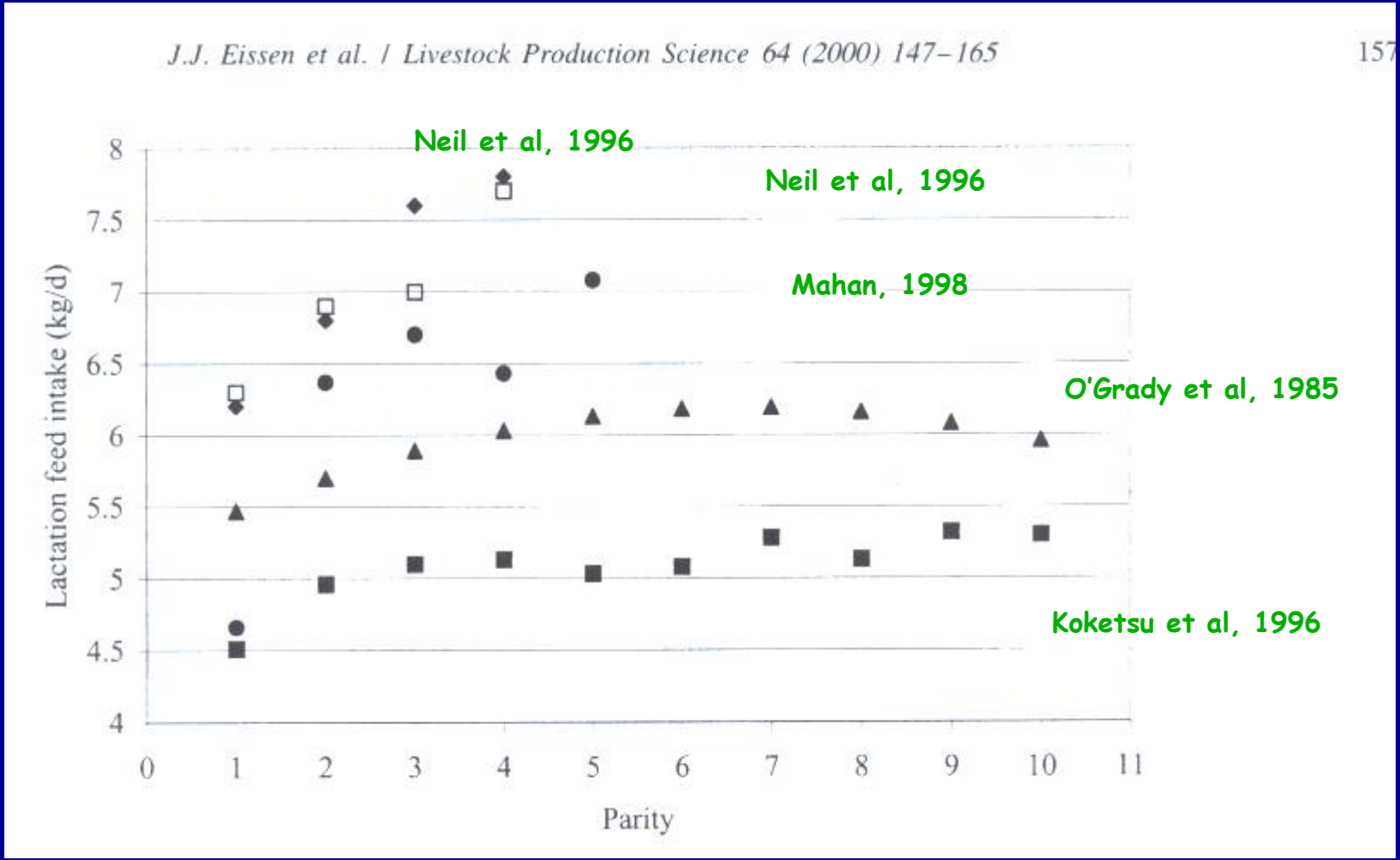
84,424 litters; 15 d wean

# Relationship between parity and lactation VFI, kg




Lynch, 2000

# Effect of parity on VFI




Eissen et al, 2000

# Gestation feeding and VFI

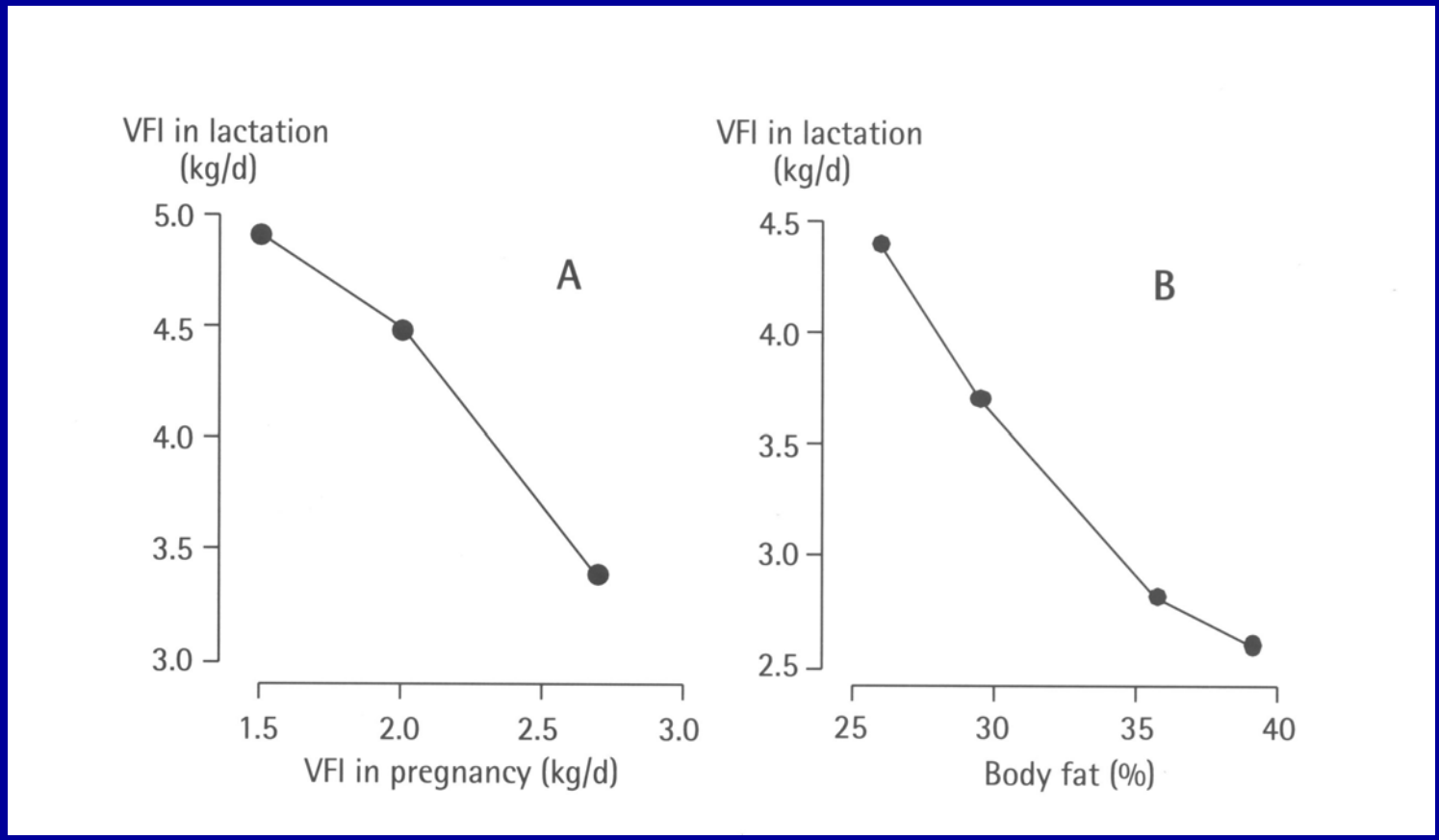
- High feed level in gestation leads to:
  - Fatter sow at farrowing
  - Lower VFI
  - Increased weight loss
  - Infertility

Kerr and Cameron, 1996

# Effect of pregnancy feed and fatness on VFI

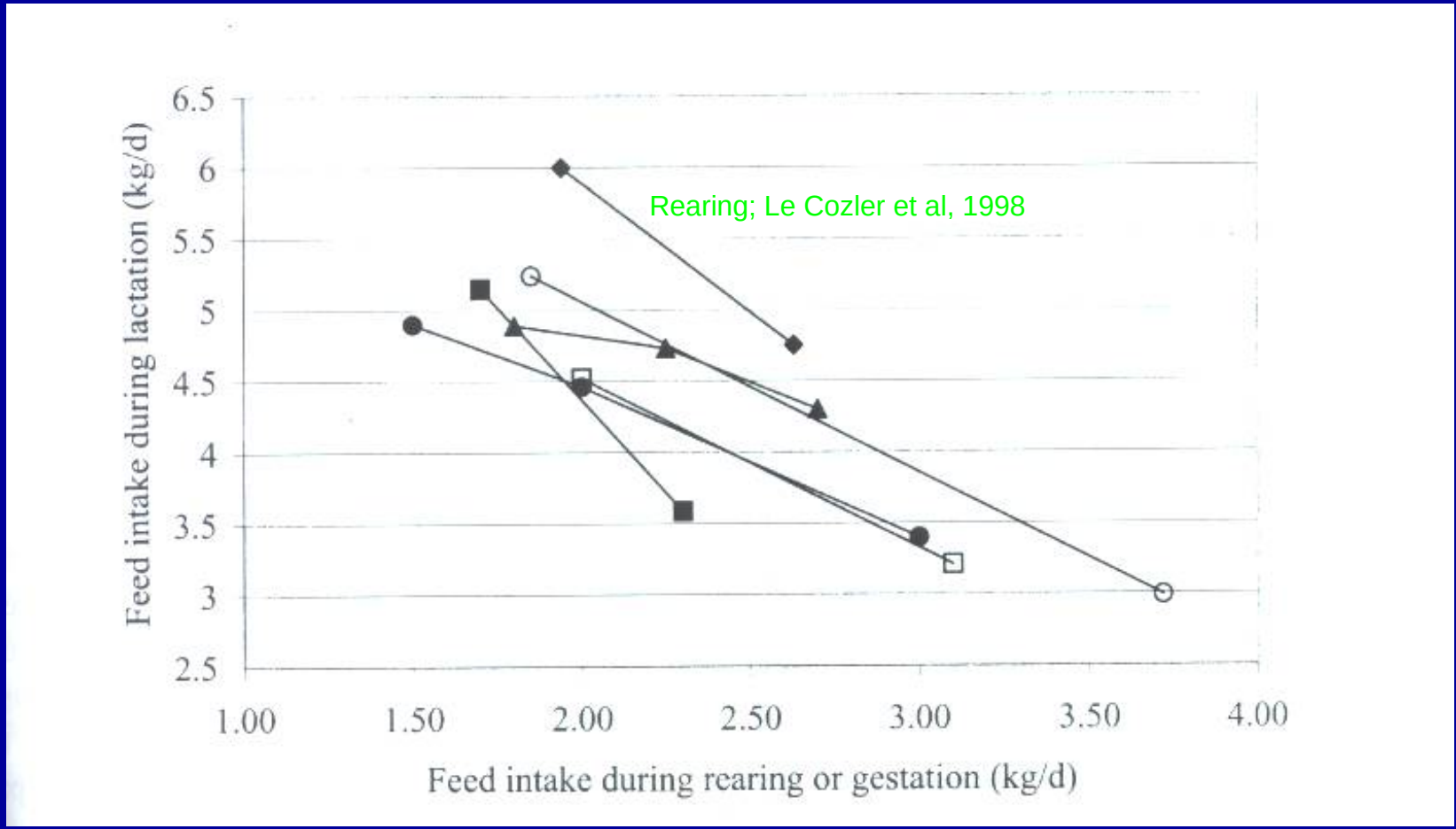
Mullan & Williams, 1989

Williams & Smit 1991



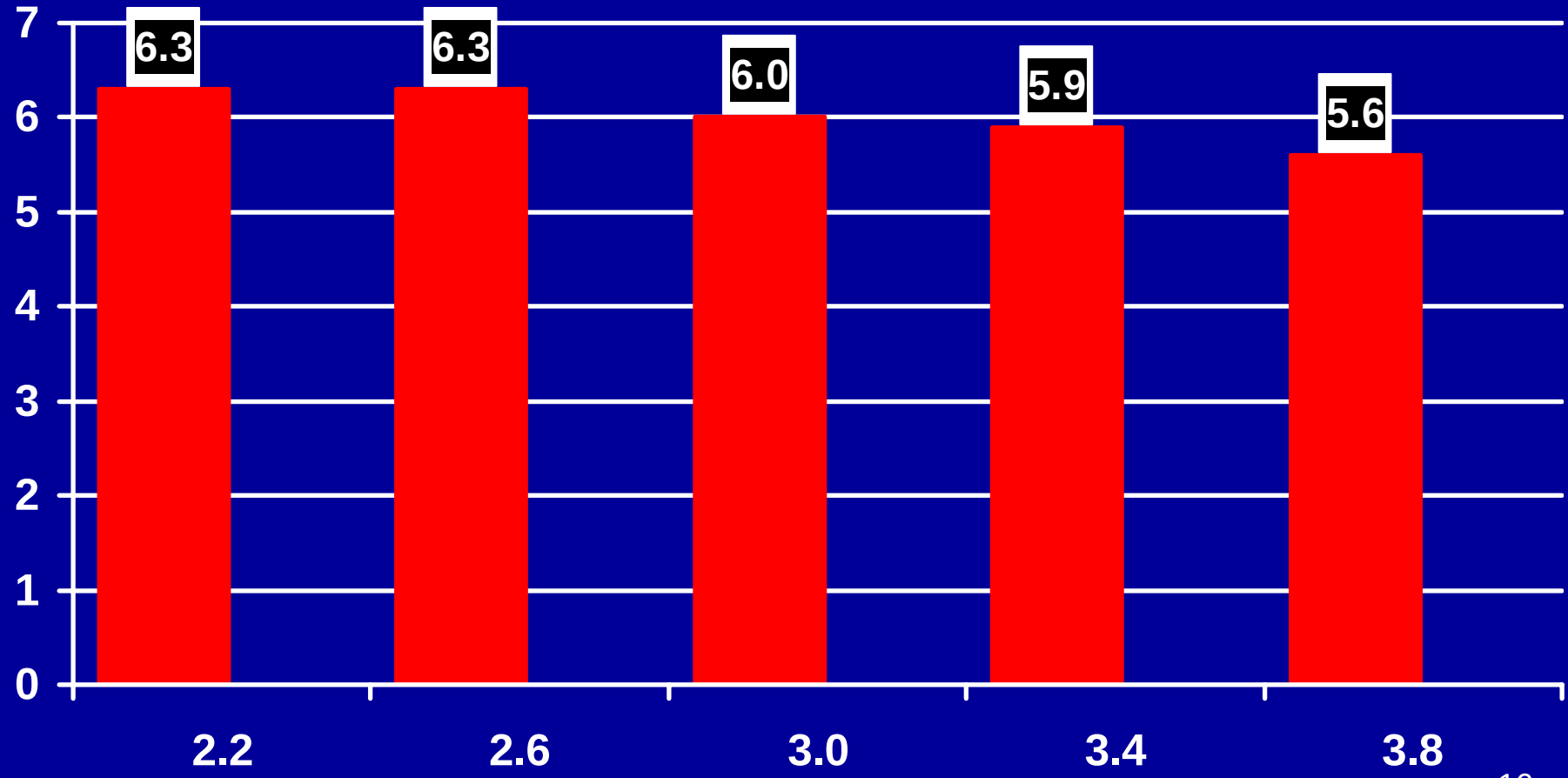

Williams, 1998 The Lactating sow

# Effect of feed level in rearing or gestation on VFI




Eissen et al, 2000

# Effect of feed level D. 66 to D. 101 on VFI, kg/d



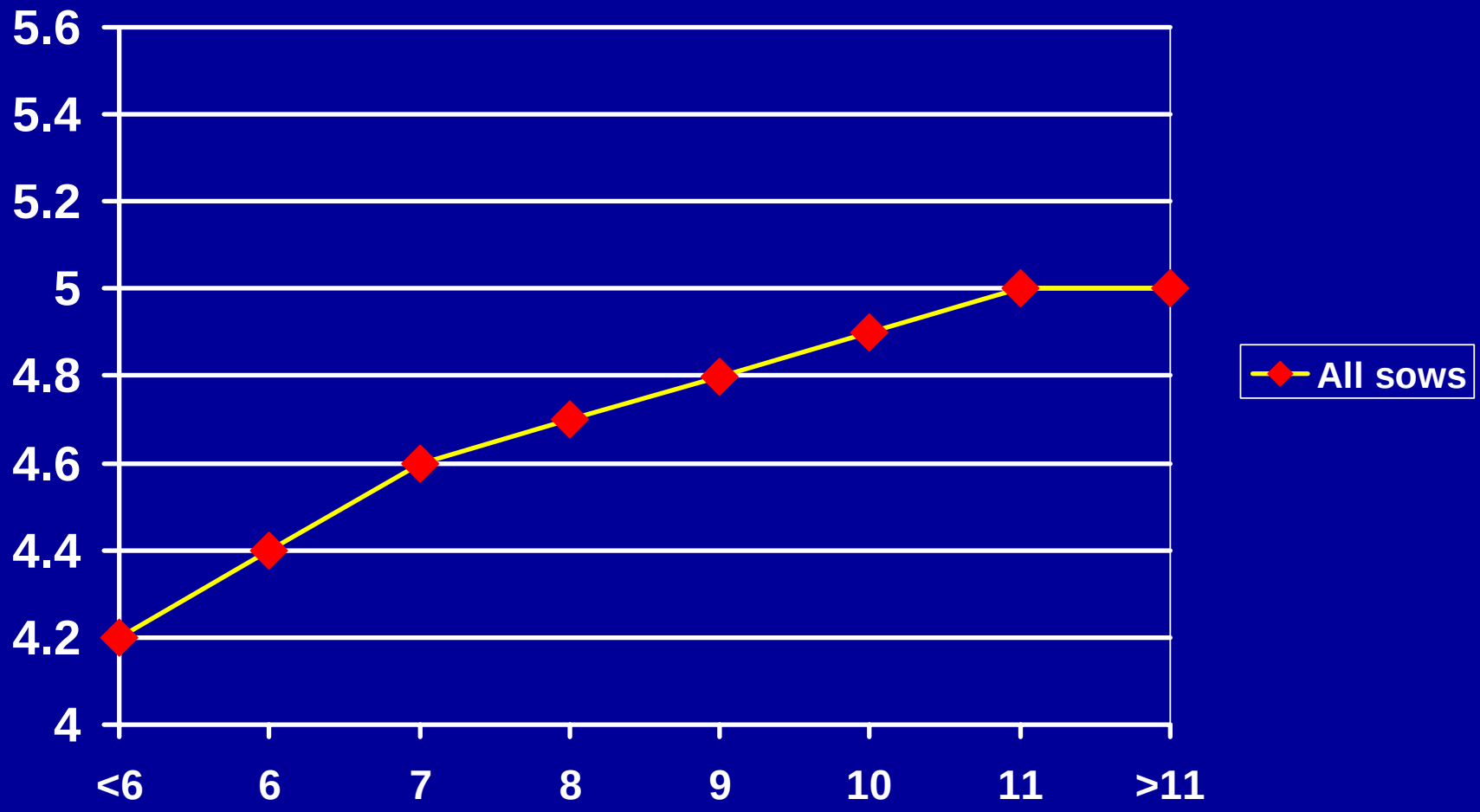

King et al, 2006

# Litter size and VFI

- Larger litters extract more milk
- VFI is increased
- Increase in VFI per extra pig is greater for smaller litters
- See Eissen et al, 2000: O'Grady et al, 1985; Koketsu et al 1996; Auldist et al 1998

Kerr and Cameron, 1996

# Relationship between no. weaned and lactation VFI, kg



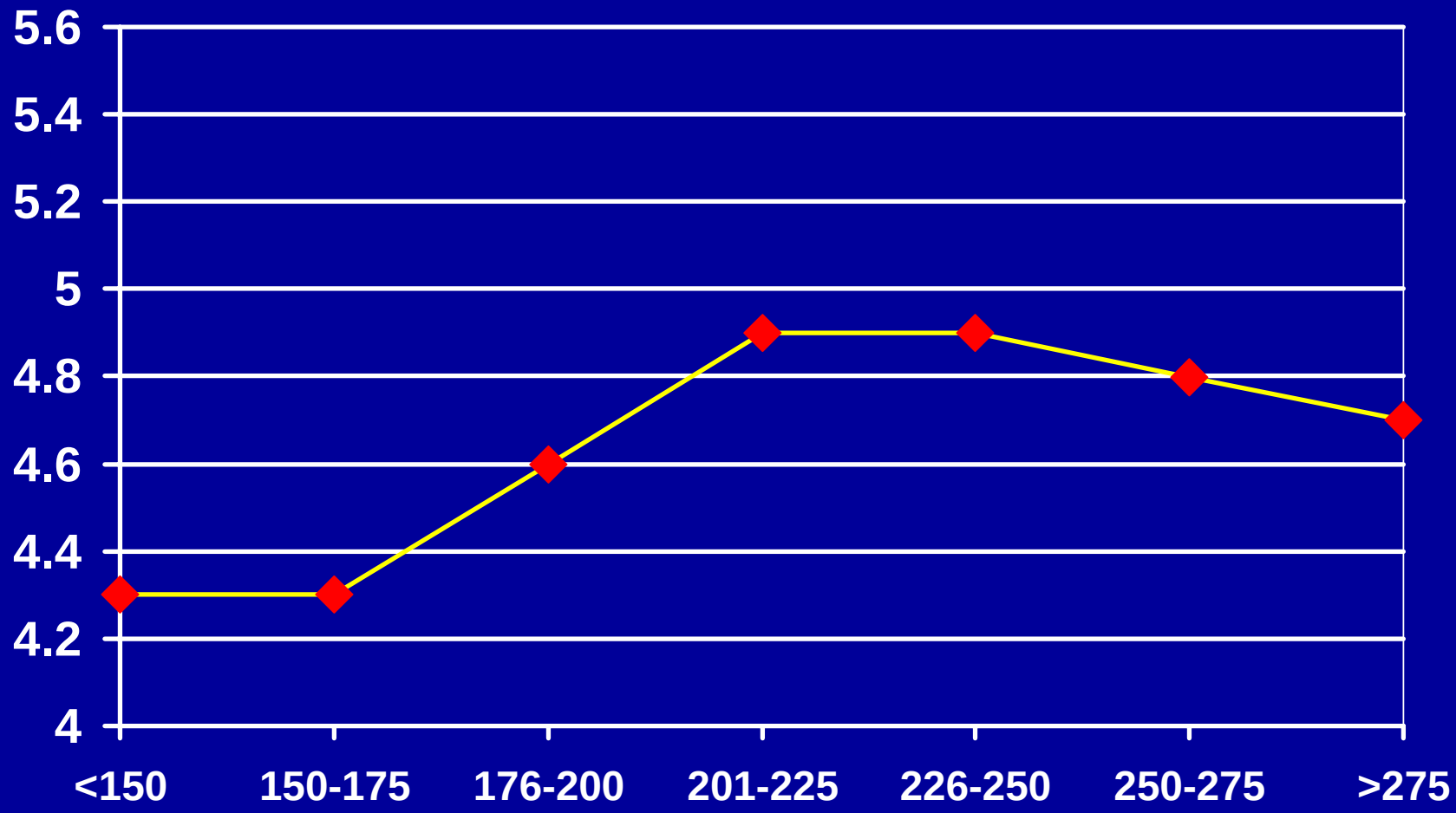

Lynch, 2000

# Sow weight

- Bigger sows have higher maintenance requirement
- Bigger/older sows have bigger litters
- Bigger sows may be fatter

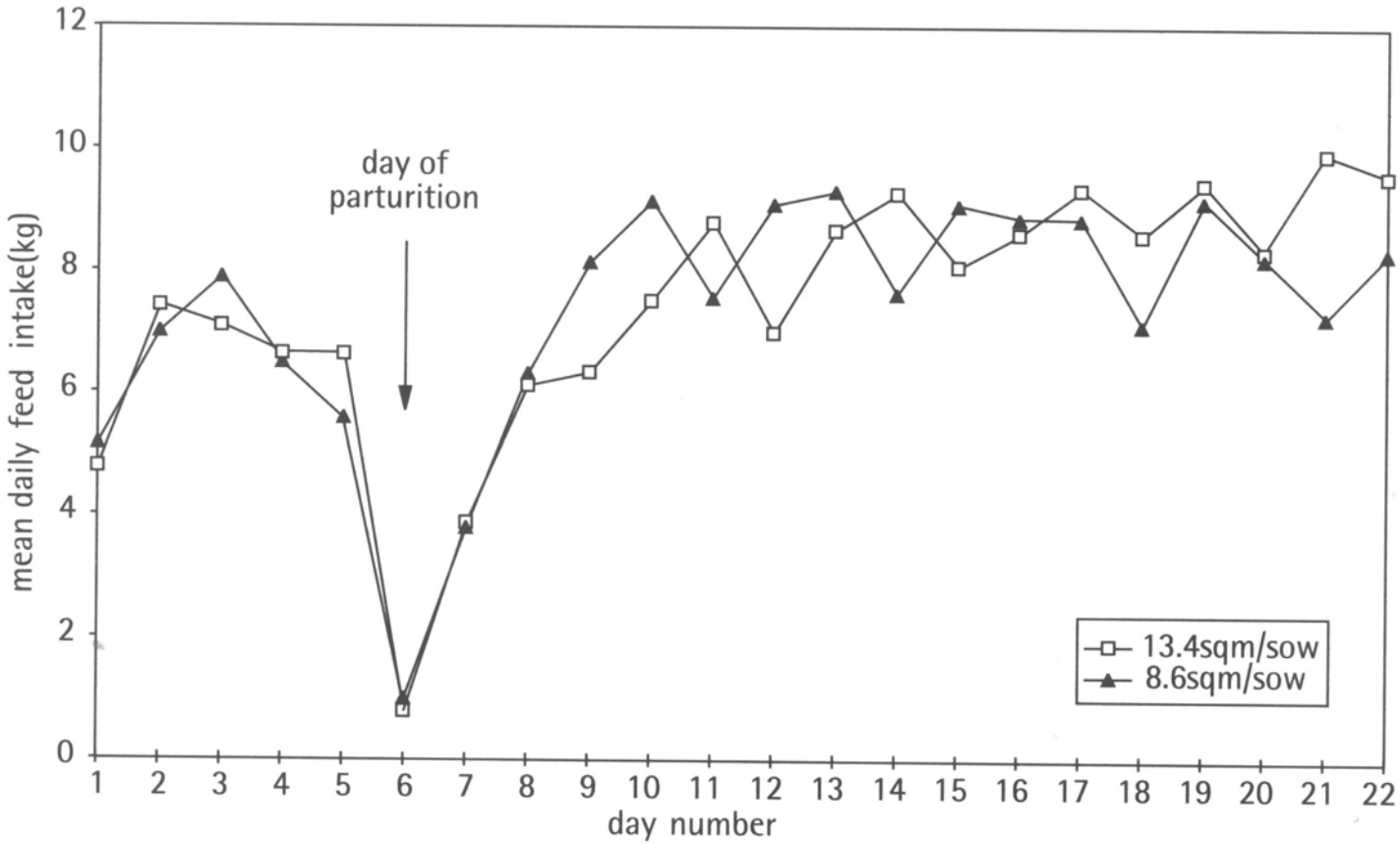
Kerr and Cameron, 1996

# Relationship between post farr. sow wt and lactation VFI, kg



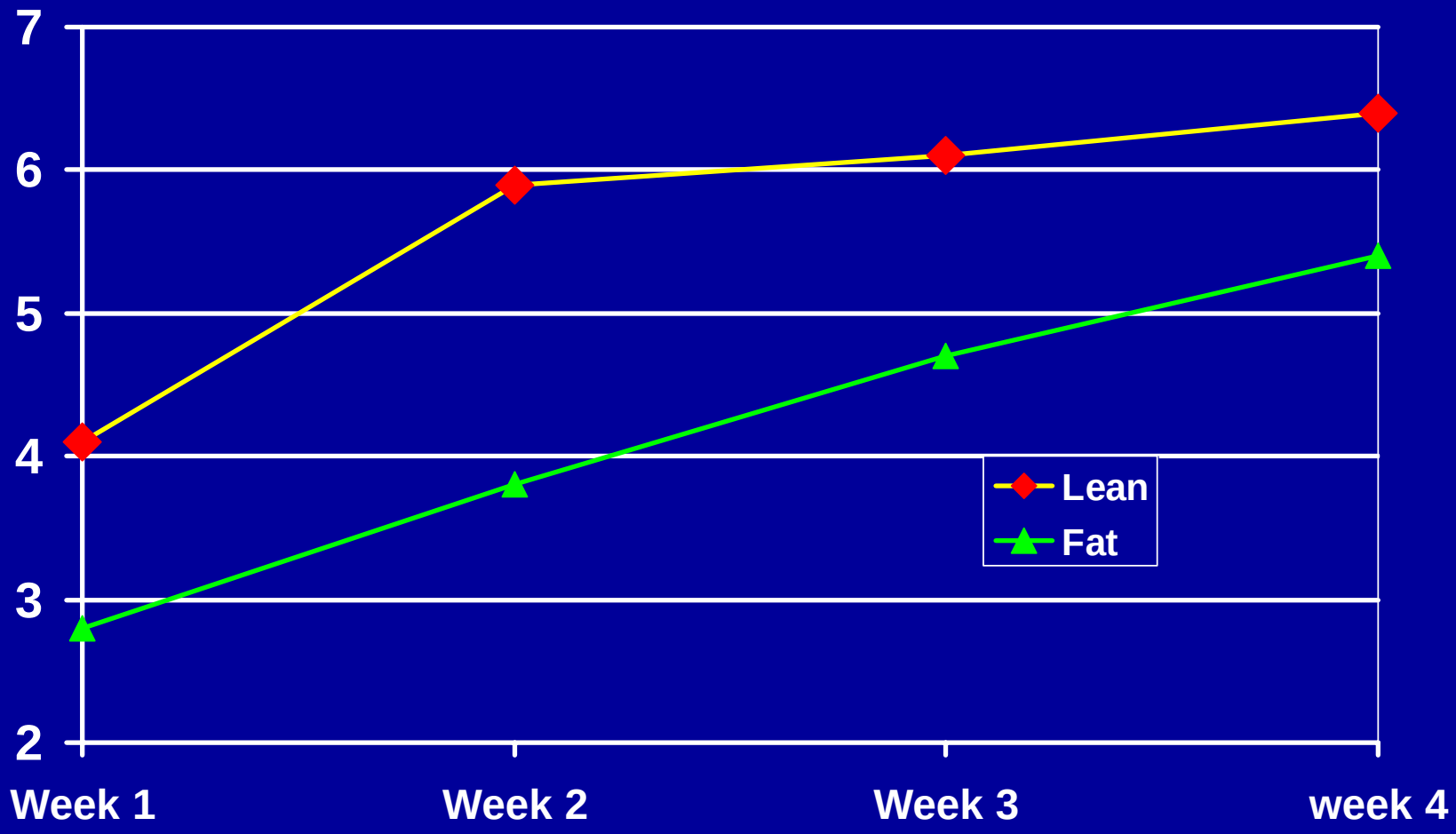

Lynch, 2000

# Pattern of VFI around farrowing, kg/d



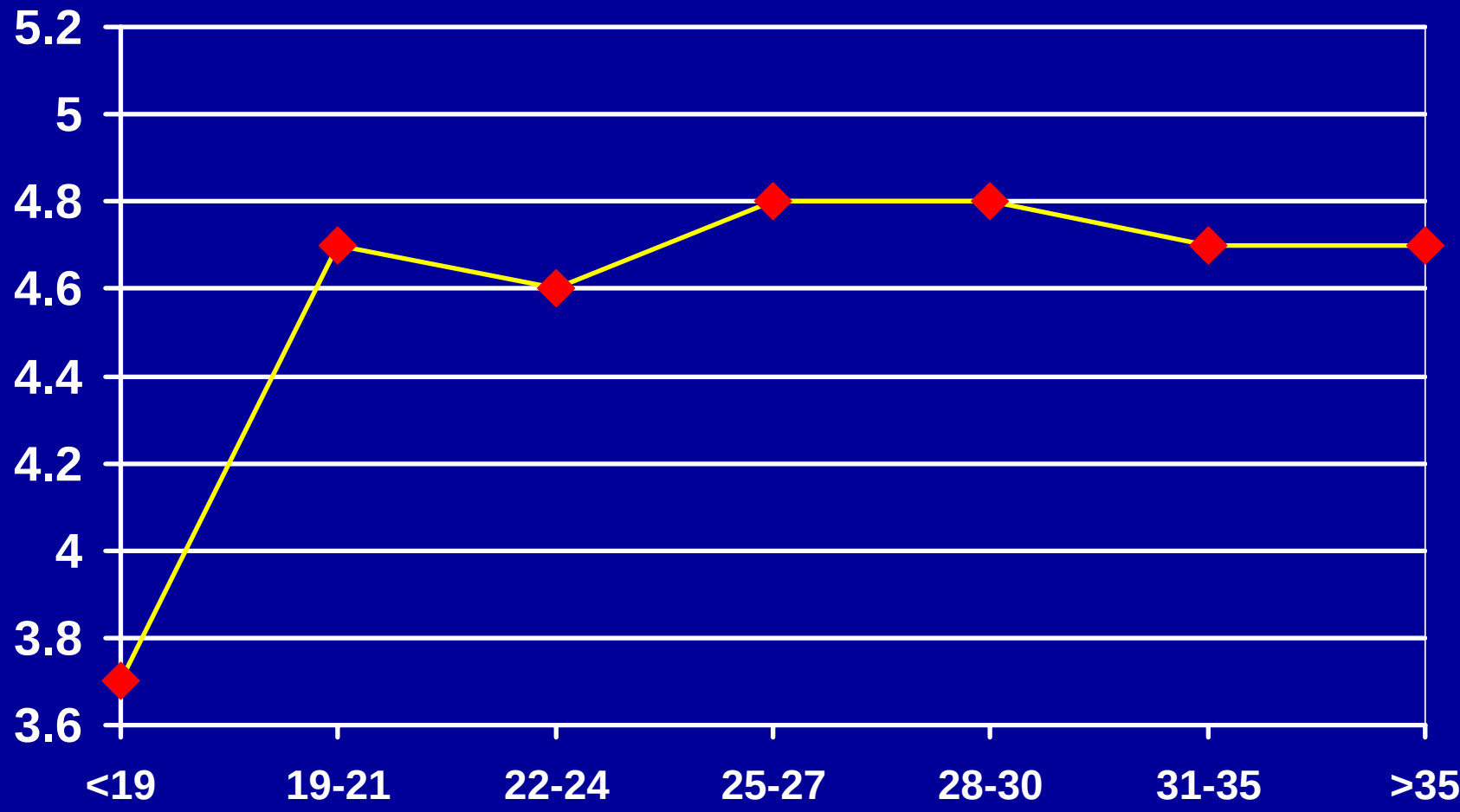

Brooks and Burke, 1998

# VFI by week of lactation, kg



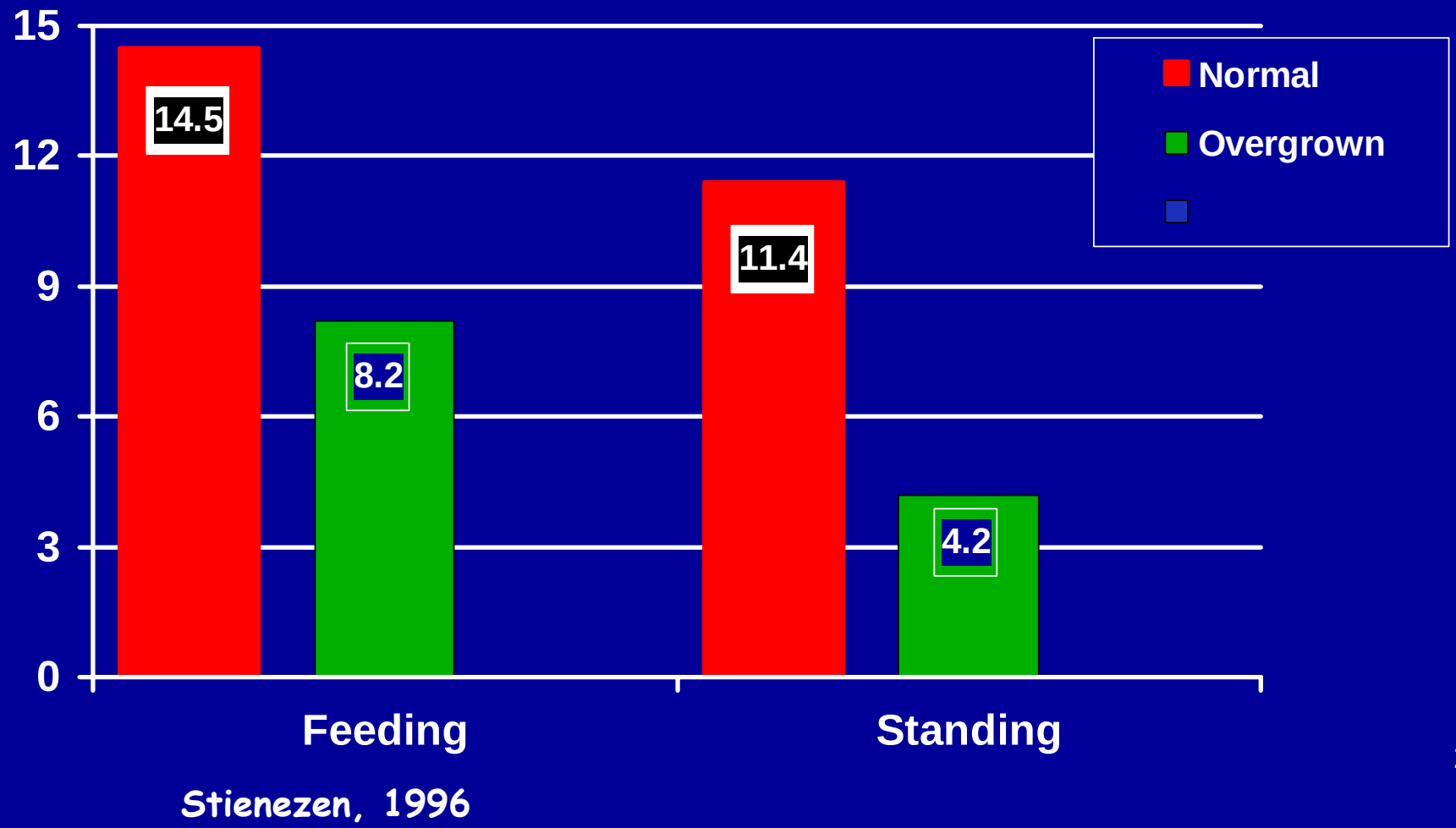

Dourmad, 1993 cited by Noblet et al, 1998

# Relationship between lactation length and lactation VFI, kg




Lynch, 2000

# Effect of hoof growth on feeding behaviour, median values, min/event

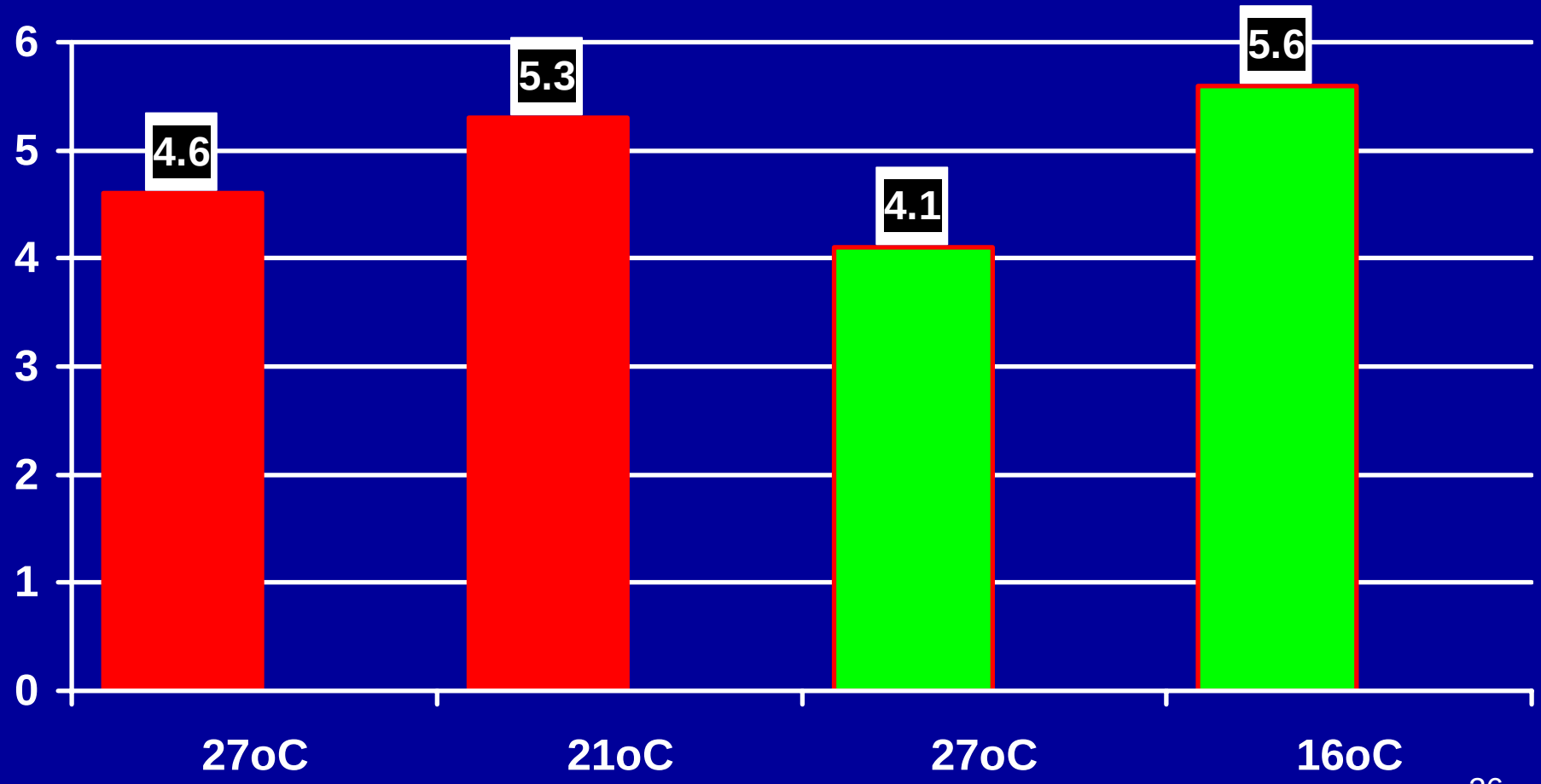



Stienezen, 1996

# Environmental factors affecting VFI in lactating sows

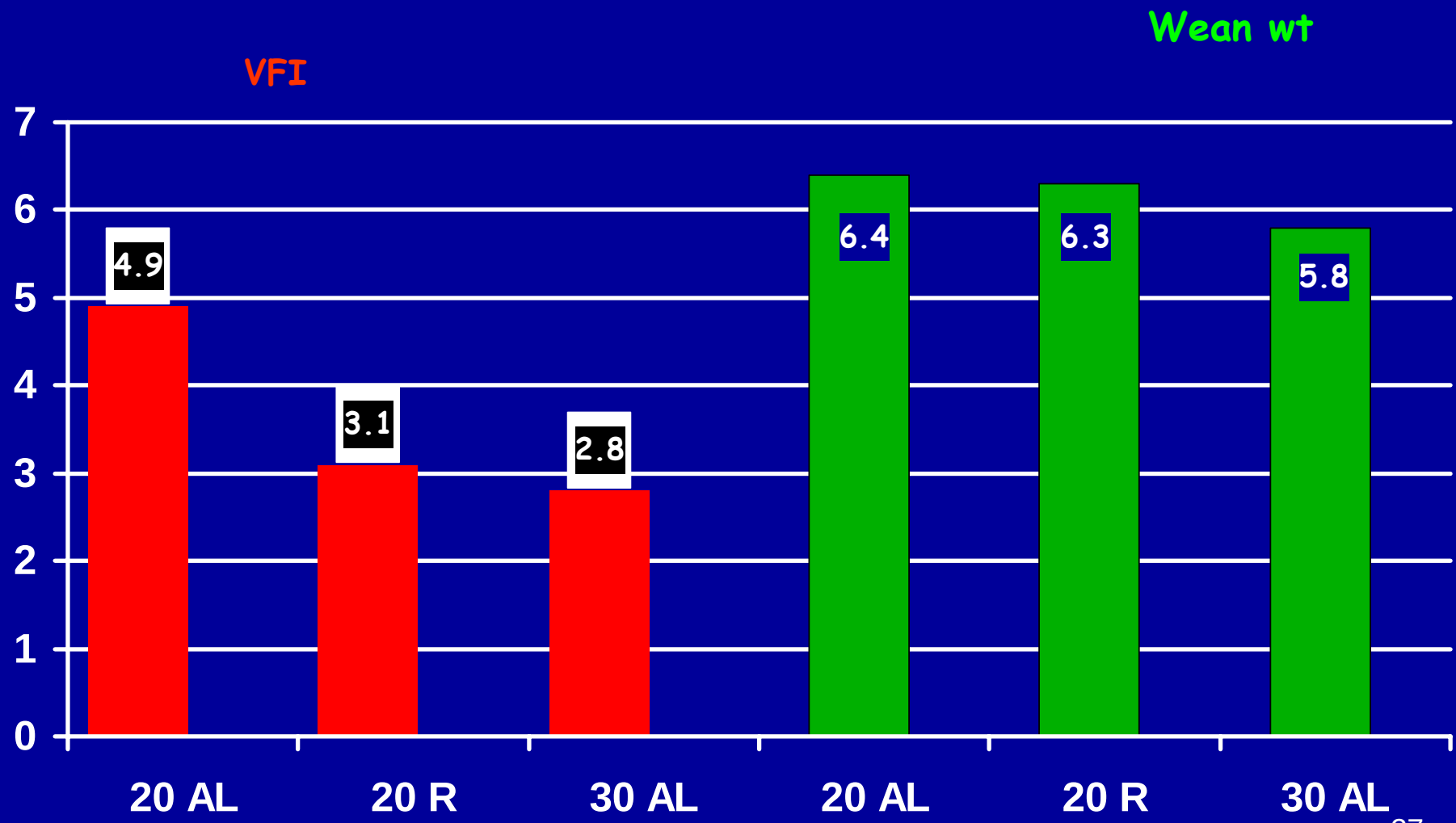
- Temperature
- Cooling
- Humidity
- Lighting

# Effect of room temperature on lactation feed intake, kg/day




Lynch & O'Grady, 1978

# Does room temperature affect milk yield?

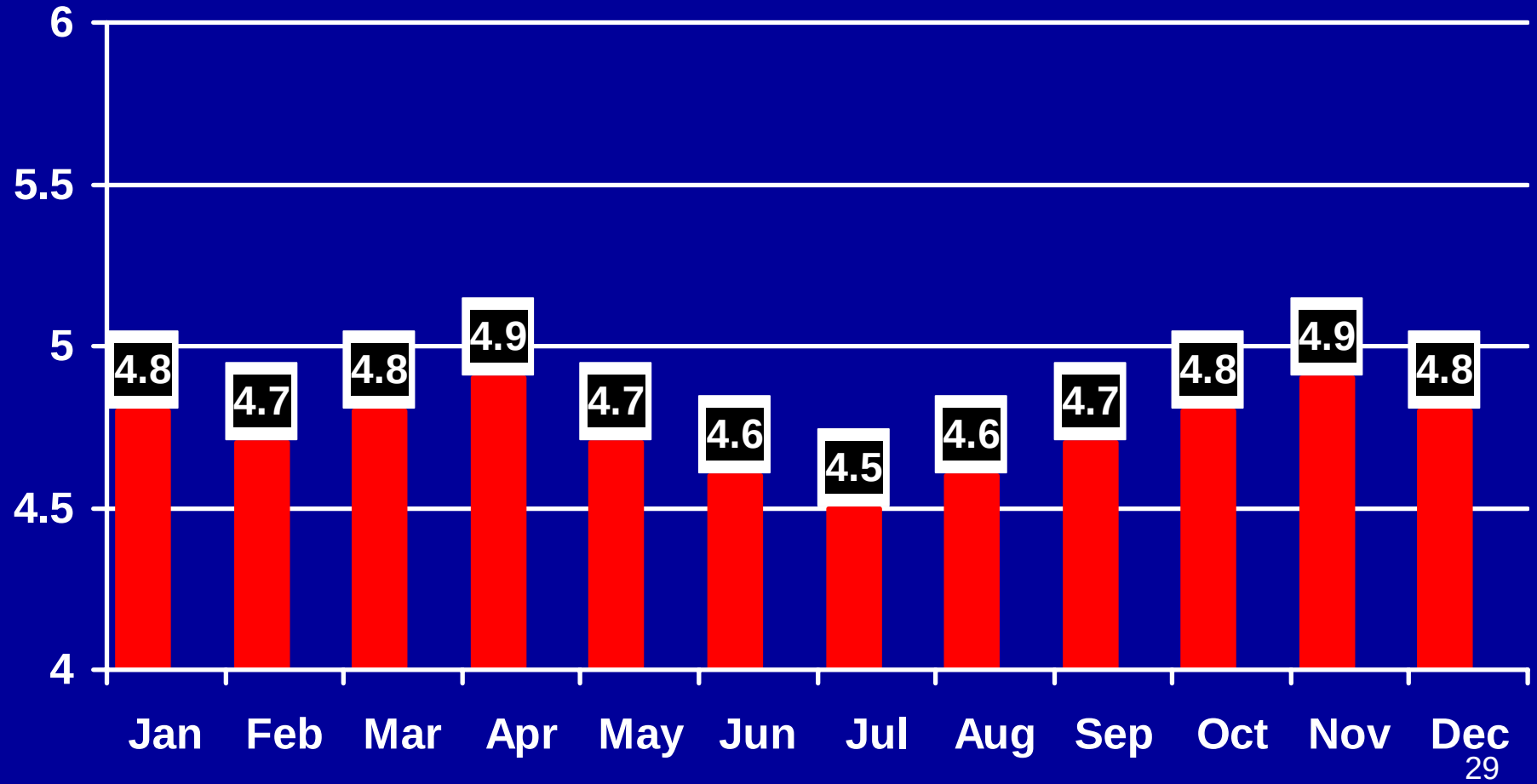



Messias de Braganca, 1997

# Steady v fluctuating temperature

- VFI under conditions of temperature fluctuation will be similar to that at the mean of the fluctuating temperature

# Monthly pattern of VFI (dry feed), kg/day




Lynch, 2000

# Other environmental factors

- High RH reduces heat loss to the environment so high RH will have a small effect on feed intake
- Giving artificial light for longer each day has a minor effect on feed intake

# Artificial cooling for sows

- Water drip/spray on sow's head
- Jet of air from outside house
- Jet of chilled air
- Evaporative cooling of incoming air
- Cooled floor pad

# Effect of floor cooling on VFI, kg/d

| | Uncooled | Cooled |
|---|---|---|
| VFI, kg/d | 5.6 | 6.5 ** |
| DE, MJ/d | 86 | 99 ** |
| Weaning wt, kg/pig | 5.3 | 6.4 ** |

Ave Max 27°C; Min 21°

Silva et al, 2006

# Dietary factors affecting VFI in lactating sows

- Energy concentration
- Protein and amino acid levels
- Diet fed in pregnancy (protein and fibre)
- Minerals
- Ingredient composition

# VHI of sows fed high and medium energy diets

DE of diet 14.7MJ vs 12.6 MJ (= + 17%)

- Feed /day, kg - 6%
- DE / day, MJ + 10%

Dourmad, 1988

# Effect of dietary fat on lactation VHI

In 16 of 19 trials fat inclusion depressed VFI*

In all 19 trials fat inclusion increased energy intake*

Fat source may be important **

(* Pettigrew and Moser, 1991: **Lauriden and Danielsen, 2004)

# Effect of dietary fat on VHI

A high fat diet may be more beneficial in warm conditions than cool conditions due to a reduced heat increment.

This may also apply to low protein diets

# Effect of dietary protein on VHI

High protein diet in lactation stimulates VFI especially if a low protein diet was fed in pregnancy

Response to high protein is greater in lean sows and in late lactation

See Williams (1998) in "The Lactating Sow"

# Effect of dietary fibre on VHI

Limited evidence that a high fibre diet in pregnancy stimulated VFI in lactation

High fibre lactation diet is expected to reduce energy intake even if VFI is increased

Dourmad, 1988

# Effect of fibre in pregnancy on VFI of lactating sows

| | Control (3%) | High fibre (12%) | F-test |
|---|---|---|---|
| Farr wt, kg | 142 | 143 | NS |
| Farr b'fat, mm | 18.5 | 16.8 | * |
| L. wt loss, kg | 12 | 17 | NS |
| Feed, kg/d | 6.2 | 6.6 | NS |

Guillemet et al, 2007

# Management factors affecting VFI in lactating sows

- Form of feed
- Feeding system
- Frequency of feeding
- Diet fed in pregnancy
- Herd

# Comparison of wet and dry feeding of lactating sows

| | Dry feed | Wet feed |
|---|---|---|
| Feed, kg/d | 4.7 | 5.3 |
| DE, MJ/d | 62 | 69 |
| Sow wt. loss, kg | 30 | 23 |

O'Grady and Lynch, 1978

# Comparison of dry, liquid and fermented liquid feed for P1 sows, kg/d

| | Dry | Liquid | Fermented |
|---|---|---|---|
| Week 1 | 3.0 | 3.5 | 3.2 |
| Week 2 | 4.8 | 6.0** | 5.6** |
| Week 3 | 6.0 | 7.4** | 7.1** |

# Comparison of 2 and 3 daily feeds for lactating sows

| | Two | Three | F-test |
|---|---|---|---|
| VFI, kg/d | 4.1 | 4.7 | P=0.06 |

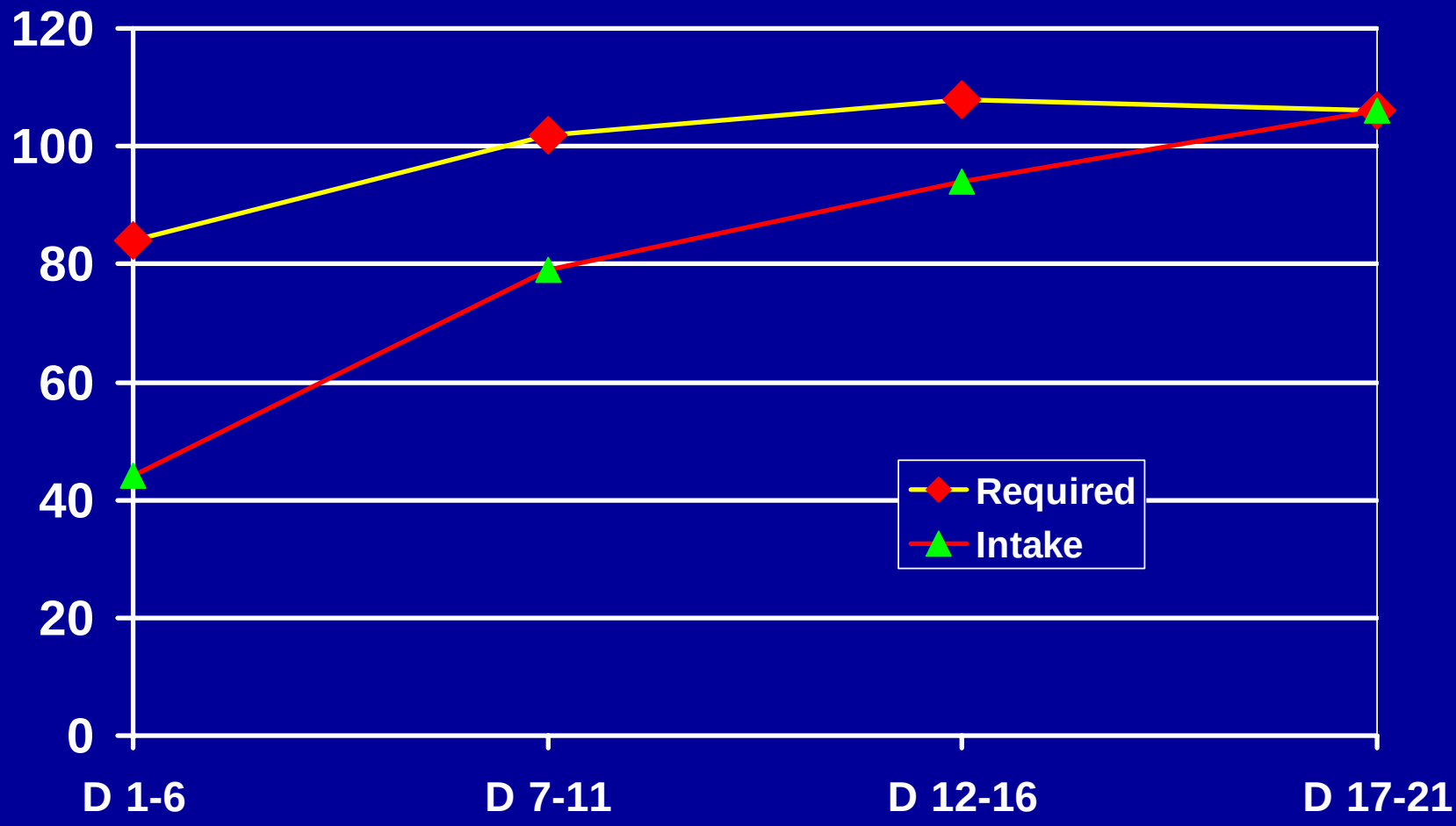
Dry feed; sows made to stand 2 or 3 times/day

O'Grady and Lynch, 1978

# Week 1 of lactation – ad libitum or restricted ?

- Restriction in week 1 is proposed to reduce MMA and avoid transient drops in intake in week 2
- Also to avoid feed refusal and constipation
- Evidence does not support the theory
- Delaying ad lib feeding will reduce total lactation intake especially in short lactations

# Energy balance of lactating sows, d. 0 to 21, MJ/d




Boyd et al, 2002 (Banff)

# Ad lib or stair-step in week 1

| | Stair-step | Ad lib |
|---|---|---|
| Week 1, kg/d | 3.4 | 5.1 ** |
| Week 2, kg/d | 5.8 | 6.4 |
| Week 3, kg/d | 6.2 | 6.4 |
| Farr - D21 | 5.1 | 6.0 * |

Belstra et al, 1998

# Comparison of scale feeding and ad lib wet-dry feeder, kg/d

| | Scale | Wet-dry | F-test |
|---|---|---|---|
| D 0-6 | 3.9 | 4.1 | NS |
| D 7-13 | 6.3 | 6.7 | NS |
| D 14-wean | 6.9 | 7.4 | * |
| Overall | 5.5 | 6.0 | ** |
| Piglet wt, kg | 6.2 | 6.6 | ** |

Peng, 2005

# Variation in VFI by day of lactation

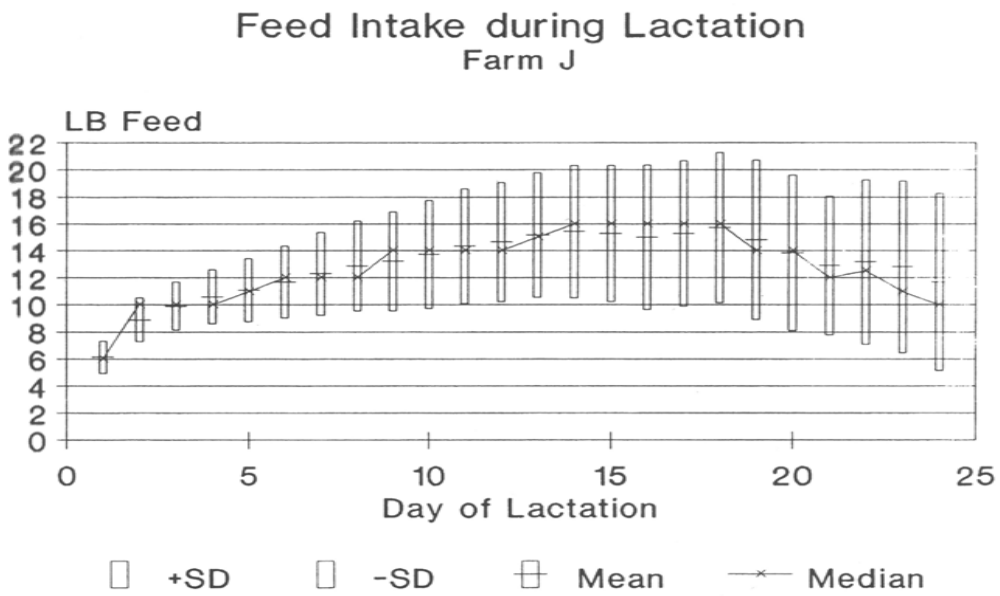
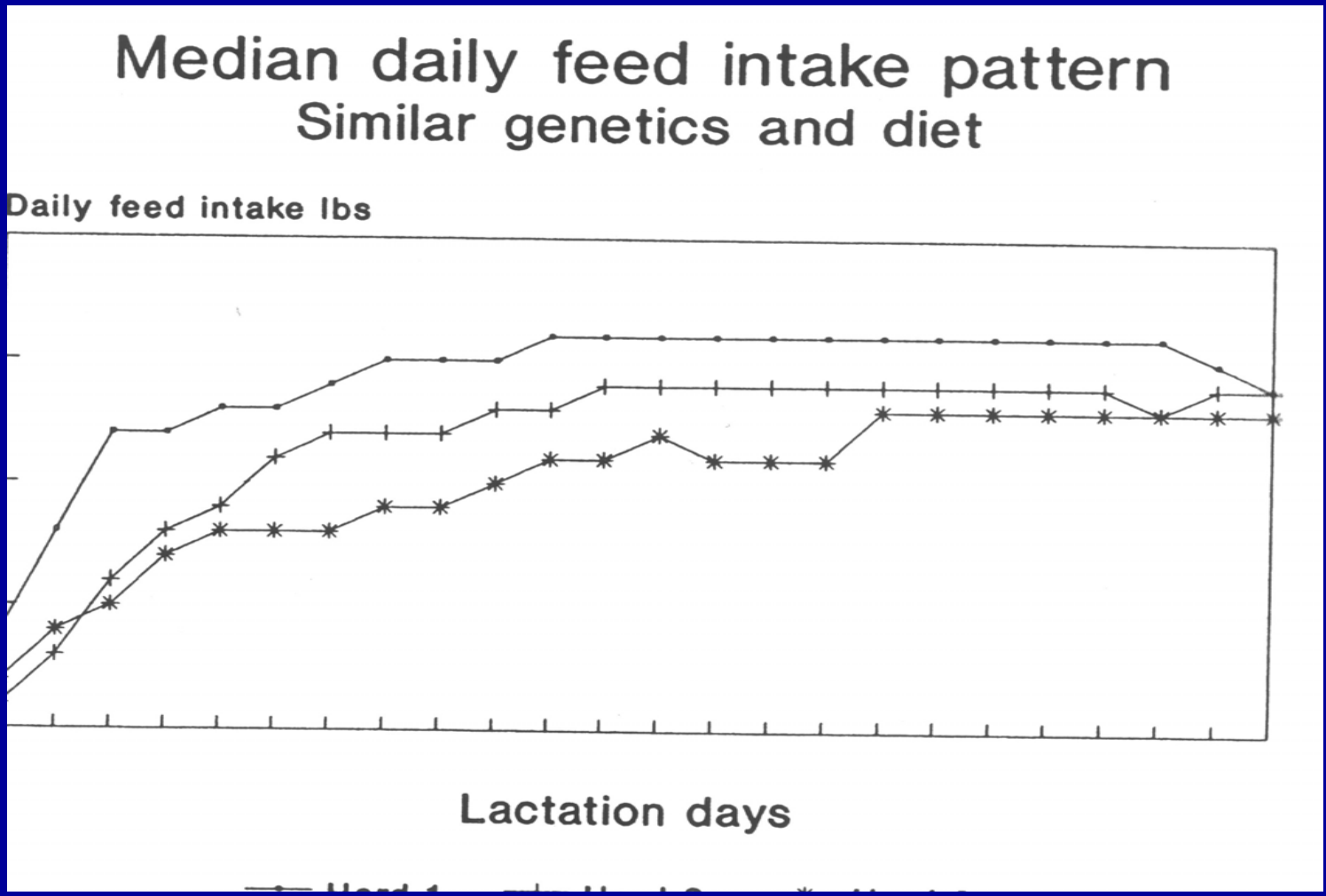



**Figure 2.** Variation in the amount of feed consumed daily by day of lactation.

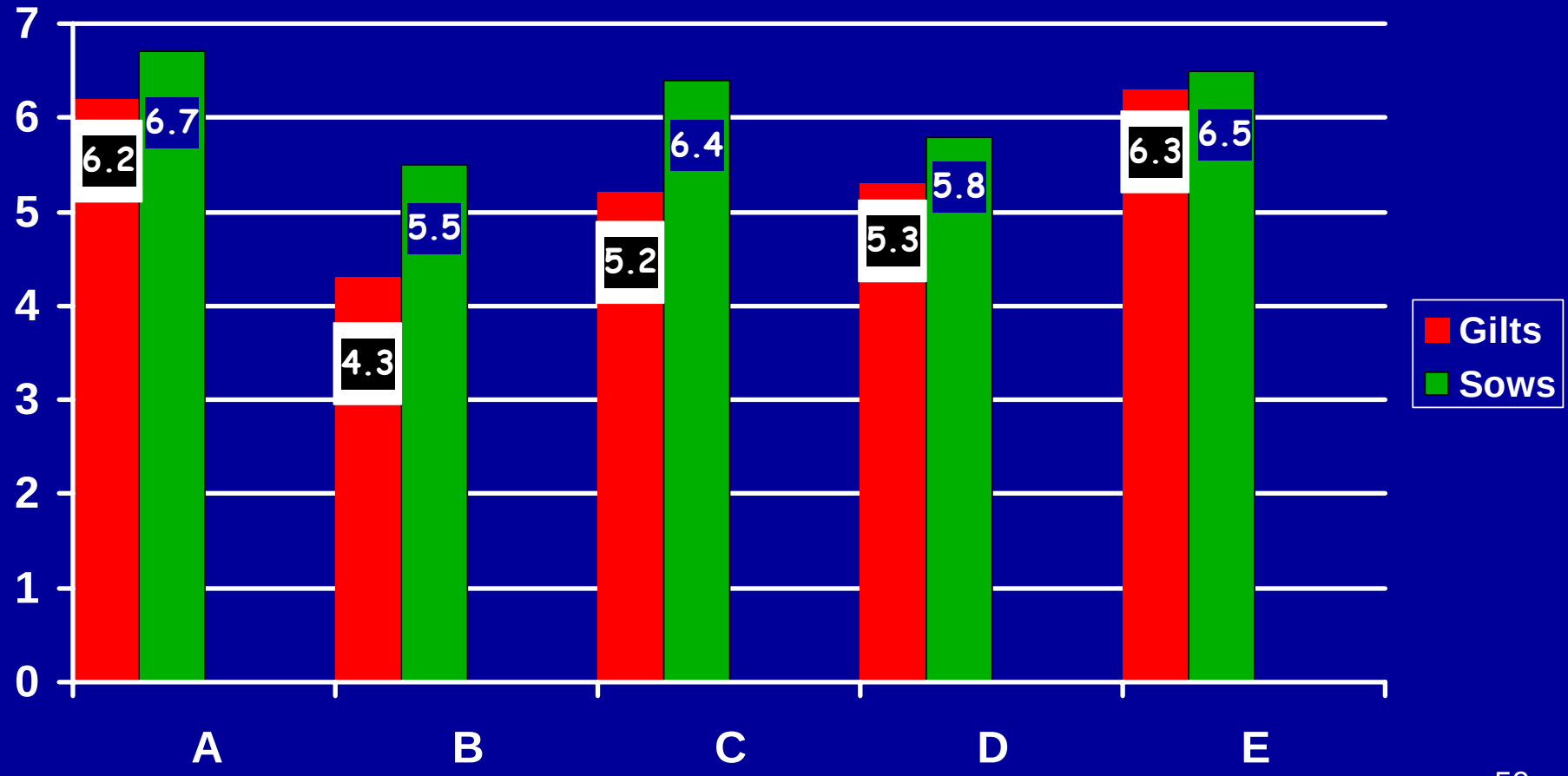
Koketsu et al, 1991. Banff

# VFI patterns on three identical farms




EAAP 2007 **Koketsu et al, 1991. Banff**

# VFI of sows on 5 farms in Australia, kg/d




Handley et al, 1995 MPP

# Liquid feeding

- Approx 50% of sows in Ireland fed liquid
- Water:meal 3:1 or higher; feed 2 or 3/day
- Computer controlled feed curve
- Concerns:
  - Ability of sow to physically consume enough feed
  - Capacity of feeder
  - Accuracy of dispensing system
  - Separation of ingredients in mix
  - See Lawlor Session 32.2

# Effect of feeding Fusarium contaminated corn or wheat on VFI, kg/d

| | Control | Contaminated |
|---|---|---|
| VFI, kg | 4.9 | 3.6** |
| Sow wt gain, kg | 1 | -12** |

Diaz-Llano & Smith, 2007

# Summary

- VFI in lactation is affected by a range of animal, environmental, dietary and management factors

- VFI is very important in sow performance, herd productivity and sow longevity