

# Future gilt management policies

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South Australia**

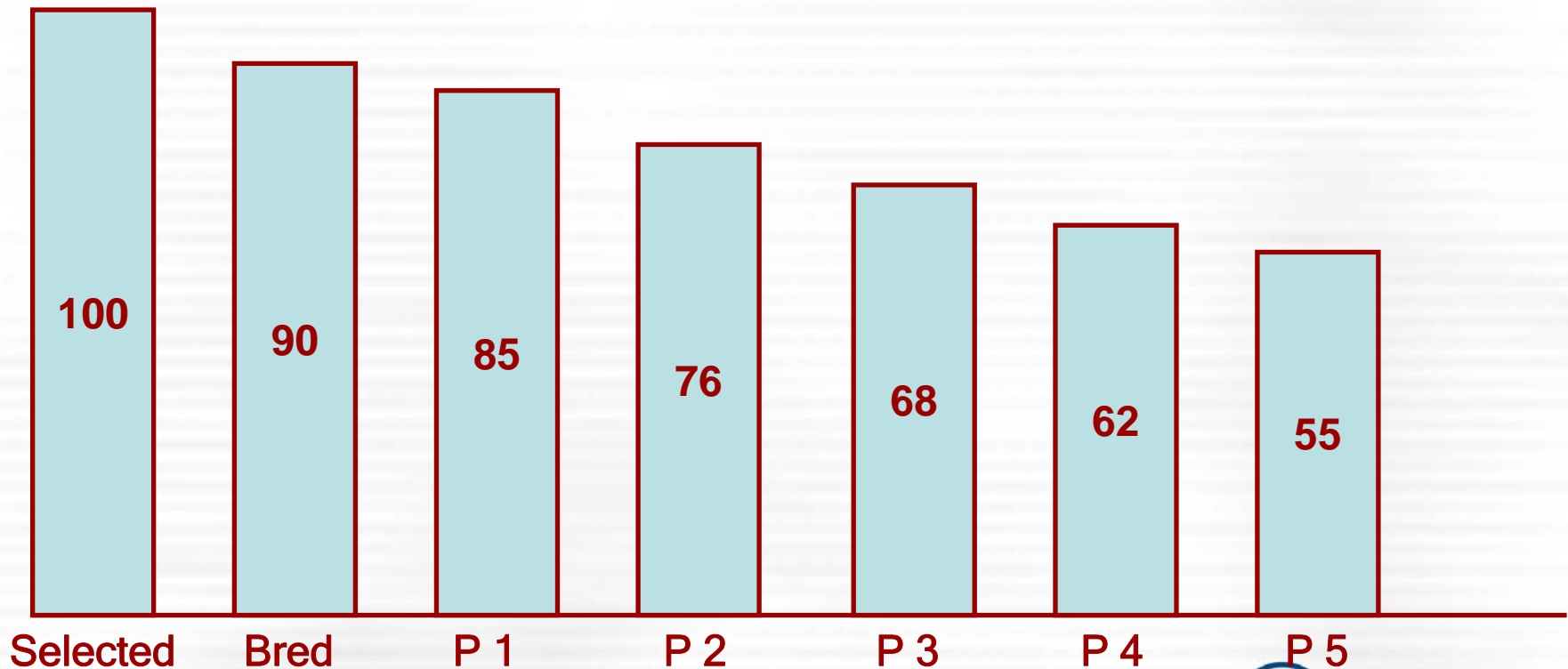


**"Hey kid, do I *look*  
hungry?"**

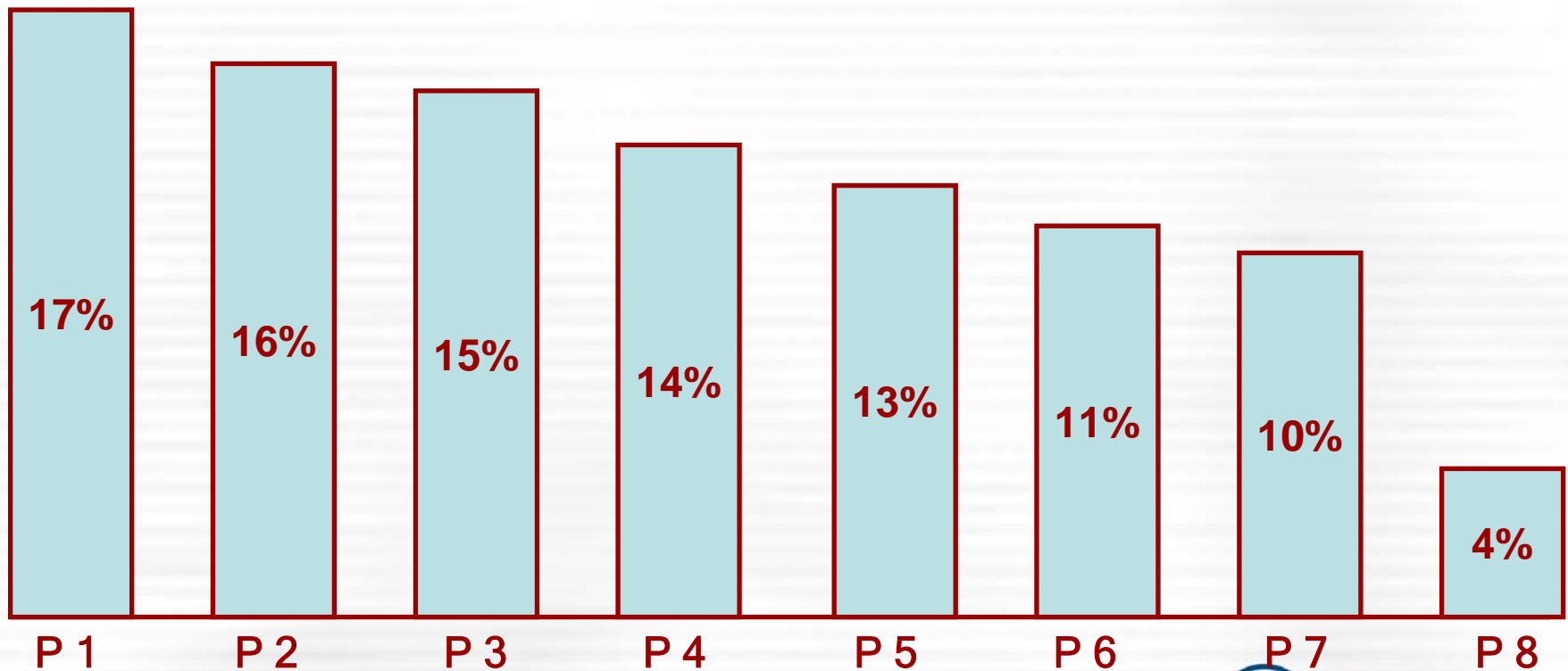
## Modern gilt management - what is the problem ?

- 15-20% of gilts only produce 1 litter
- 40-50% of sows are culled before 3<sup>rd</sup> parity
- At least 3 litters are required to achieve profit from a sow
- Herd parity structure is out of balance

## Target herd parity structure



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## What has changed ?

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  - Heavier, leaner sow

# The Pig Has Changed !!

|   | 1983 | 1993 |
|---|------|------|
| LW at start of stimulation at 23 weeks (kg) | 90   | 105  |
| P2 backfat at start of stimulation (mm)     | 16   | 10   |
| LW at 1 <sup>st</sup> weaning (kg)          | 150  | 185  |
| P2 backfat at 1 <sup>st</sup> weaning (mm)  | 25   | 15   |
| LW at 3 <sup>rd</sup> weaning (kg)          | 190  | 240  |
| P2 backfat at 3 <sup>rd</sup> weaning (mm)  | 22   | 17   |

## What has changed ?

- The pig has - last 10-20 years of selection has produced a very different pig:
  - Later maturing (later puberty)
  - Heavier, leaner sow
  - Higher ovulating (but will ovulate smaller, lower quality oocytes)

## What has changed ?

- The pig has - last 10-20 years of selection has produced a very different pig:
  - Later maturing (later puberty)
  - Heavier, leaner sow
  - Higher ovulating (but will ovulate smaller, lower quality oocytes)
  - In some cases it is more willing to return to heat during lactation or early post-weaning

**To fix this problem we need to re-think how we  
manage the gilt**

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# What are we trying to do when managing gilts ?



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## What are “adequate body reserves” for a gilt ?

- How much fat does she need ?
- How heavy should she be ?

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- **How much fat does she need ?**
- How heavy should she be ?

## What about targets for gilt fat levels ?

- While it would be nice to target 14-16mm P2 backfat at 1<sup>st</sup> farrowing this is unachievable in many modern genotypes
- Anyway, there appears to be little or no relationship between gilt backfat level & lifetime performance
- This may reflect the fact that the vast majority of tissue mobilisation in young lactating females is protein not fat

## What are “adequate body reserves” for a gilt ?

- How much fat does she need ?
- **How heavy should she be ?**

## Why breed gilts at 135-150kg ?

### <135kg

- Low wt at 1<sup>st</sup> farrowing
- Low body reserves at 1<sup>st</sup> farrowing
- High anoestrus rate after 1<sup>st</sup> weaning
- High risk of early culling
- Low production over 1<sup>st</sup> 3 parities

### >150kg

- High wt at 1<sup>st</sup> farrowing
- High gilt cost to 1<sup>st</sup> farrowing
- High nutrient requirements
- High risk of early culling

Adapted from Foxcroft & Patterson (2010)

## What are we trying to do when managing gilts ?

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## Conventionally this consists of 2 steps

**Birth**



**Puberty**

**Mating**

**1. Stimulate puberty**

**2. Mate at a suitable time  
after puberty (2<sup>nd</sup>. oestrus ?)**

# Stimulating puberty

## Why stimulate early puberty ?

- **reduces gilt costs**
- **increases management flexibility**
- **reduces gilt wastage (culling %)**

## Methods Available to Stimulate Early Puberty

- **Boar contact** - usually referred to as **The Boar Effect**
- **Stress**
  - transport
  - management stressors (mixing & relocation)
- **Exogenous hormones**
  - pregnant mare's serum gonadotrophin + human chorionic gonadotrophin (PMSG/hCG)

# Stimulating Puberty using Boar Contact

## How to Make the Boar Effect Work Reliably

- Ensure the boar is of high stimulus value
- Expose gilts that are at their maximum responsiveness to puberty stimulation
- Put boar & gilts together in such a way that stimulus transfer is maximised

## How to Make the Boar Effect Work Reliably

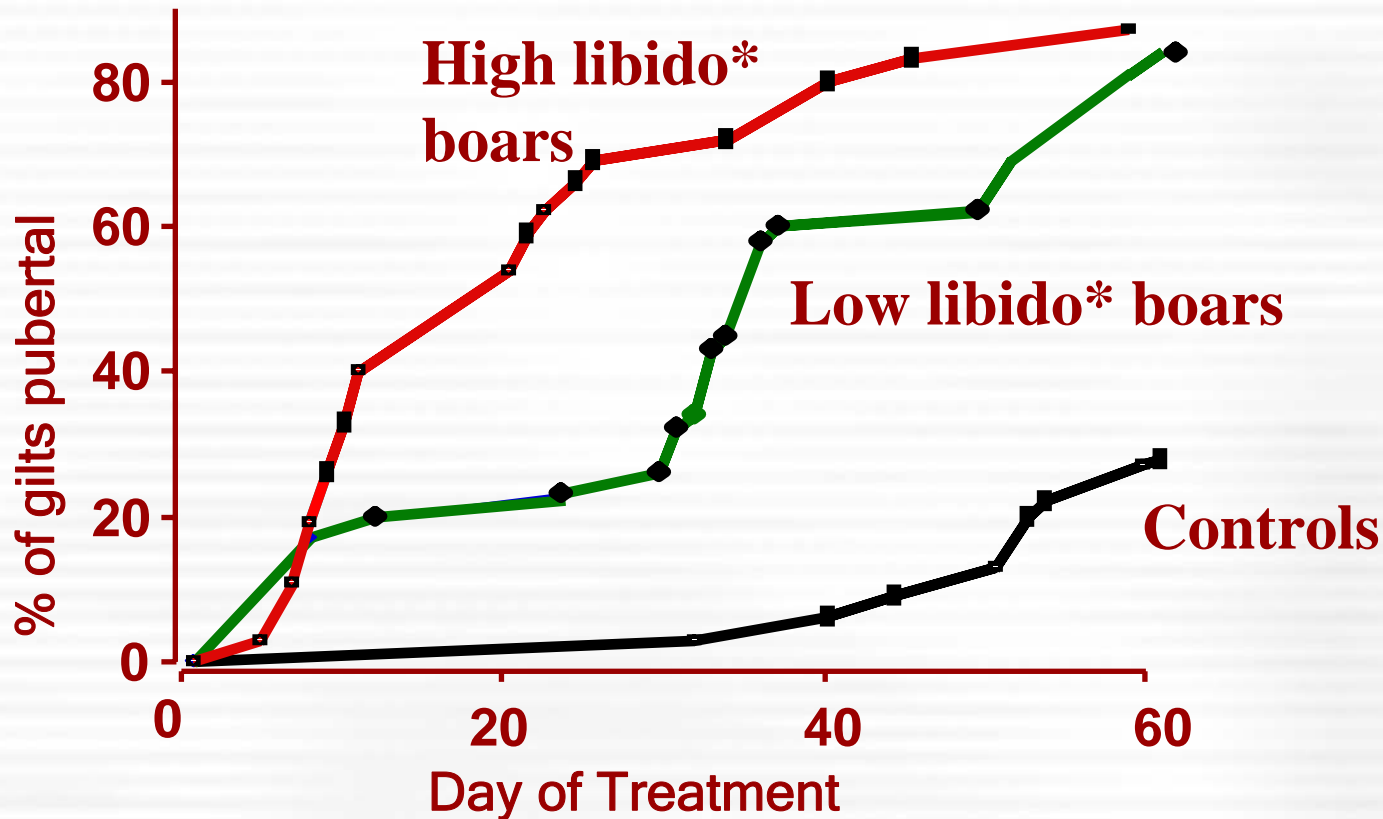
- Ensure the boar is of high stimulus value
- Expose gilts that are at their maximum responsiveness to puberty stimulation
- Put boar & gilts together in such a way that stimulus transfer is maximised

## Don't use boar <9-10 months of age

| Treatment                            | Interval from start of treatment to puberty (days) |
|--------------------------------------|--|
| No boar contact                      | 39   |
| Daily exposure to 6.5 month-old boar | 42   |
| Daily exposure to 11 month-old boar  | 18   |
| Daily exposure to 24 month-old boar  | 19   |

Source: Kirkwood and Hughes (1981)

## Ensure the boar is performing regular matings



\*

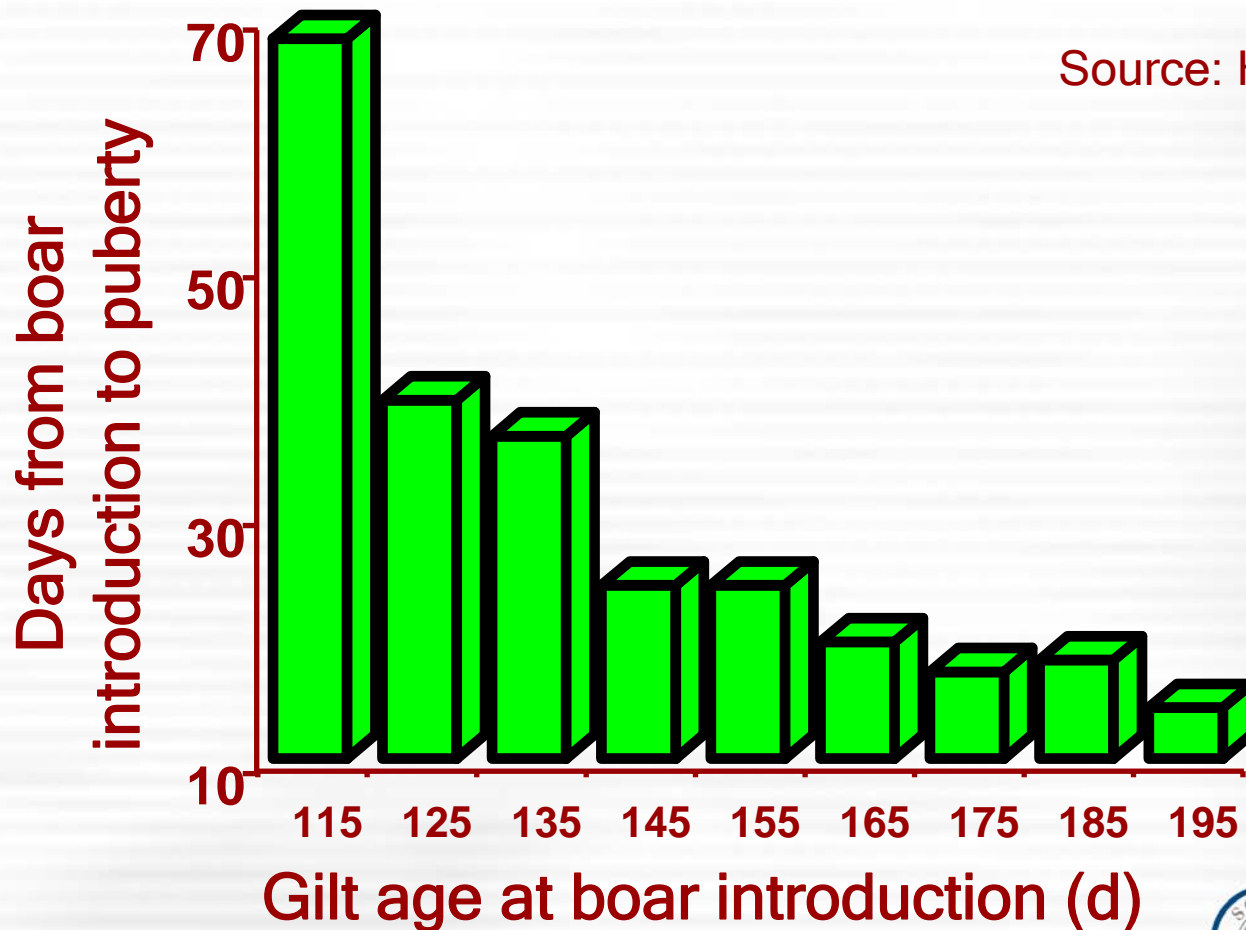
Assessed as the boar's sexual motivation in standardised mating tests



## How to Make the Boar Effect Work Reliably

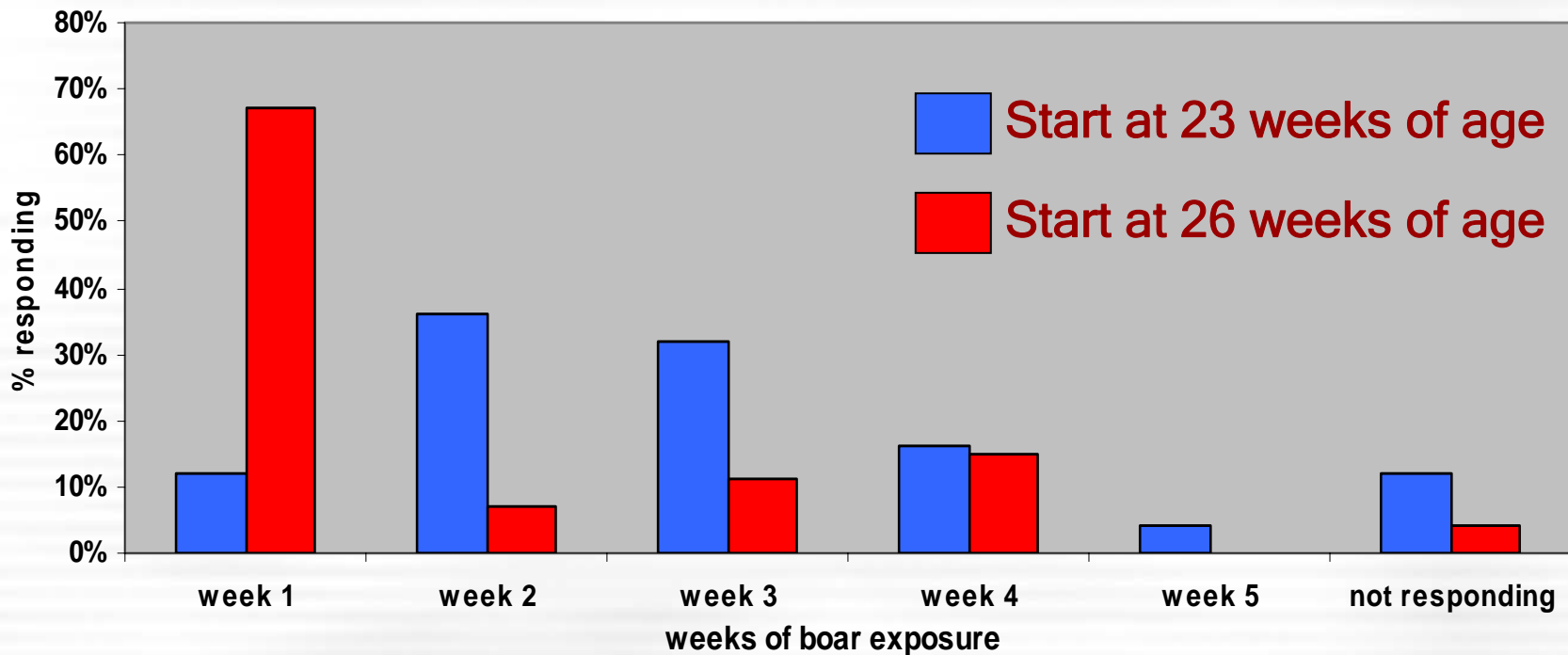
- Ensure the boar is of high stimulus value
- **Expose gilts that are at their maximum responsiveness to puberty stimulation**
- Put boar & gilts together in such a way that stimulus transfer is maximised

## Start stimulation at 150-170 days



Source: Hughes (1981)

## Proportion of gilts responding to boar exposure (van Wettere & Hughes - unpublished data)



## Gilts are less responsive to boars in Summer

| Season | Boar Contact | Gilts pubertal by 225 days of age (%) |
|--------|--------------|---------------------------------------|
| Winter | Yes          | 89                                    |
| “      | No           | 53                                    |
| Summer | Yes          | 74                                    |
| “      | No           | 14                                    |

The timing & severity of this “seasonal infertility” is variable & unpredictable

## How to Make the Boar Effect Work Reliably

- Ensure the boar is of high stimulus value
- Expose gilts that are at their maximum responsiveness to puberty stimulation
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## Fenceline contact is not sufficient

|   | No boar contact | Fenceline boar contact | Full boar contact |
|---|-----------------|------------------------|-------------------|
| <i><u>Mean days from start of boar contact to puberty</u></i> |                 |                        |                   |
| Study 1   | 56              | 41                     | 21                |
| Study 2   | 37              | 34                     | 10                |

## A Standard Australian DMA



## Fenceline contact is not sufficient in a DMA

Pubertal by 40  
days (%)

No boar exposure 0

Boar exposure in DMA (fenceline) 21

Boar contact in boar pen 50

Boar contact in DMA 64



## Use small groups of gilts (4 - 12)

**If using large groups of gilts (e.g. 30-50)  
use groups of boars  
(approx. 1 boar/12-15 gilts)**

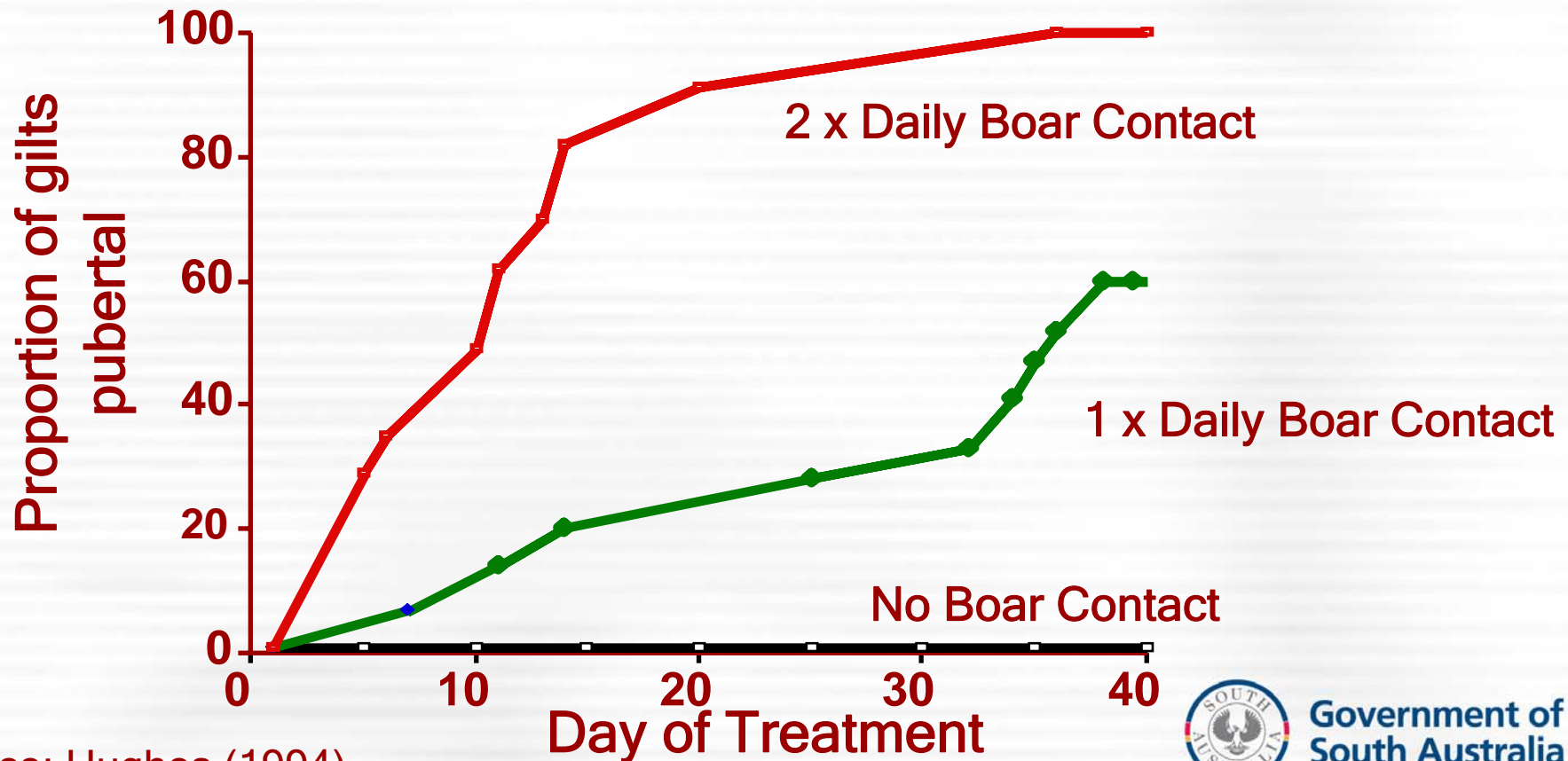
## Allow 15-20 minutes/day of contact

|         | Boar<br>contact<br>(min or h/d) | Days taken<br>to reach<br>puberty |
|---------|---------------------------------|-----------------------------------|
| Study 1 | 0.5 h/d                         | 27                                |
|         | 24 h/d                          | 23                                |
| Study 2 | 2 min/d                         | 25                                |
|         | 10 min/d                        | 17                                |
|         | 30 min/d                        | 14                                |
| Study 3 | 5 min/d                         | 27                                |
|         | 20 min/d                        | 18                                |

## Give daily contact

| Frequency of boar contact<br>(times/week) | Mean days<br>to puberty |
|---|-------------------------|
| 0   | 51                      |
| 2   | 34                      |
| 5   | 29                      |
| 7   | 19                      |

## Try twice-daily boar contact

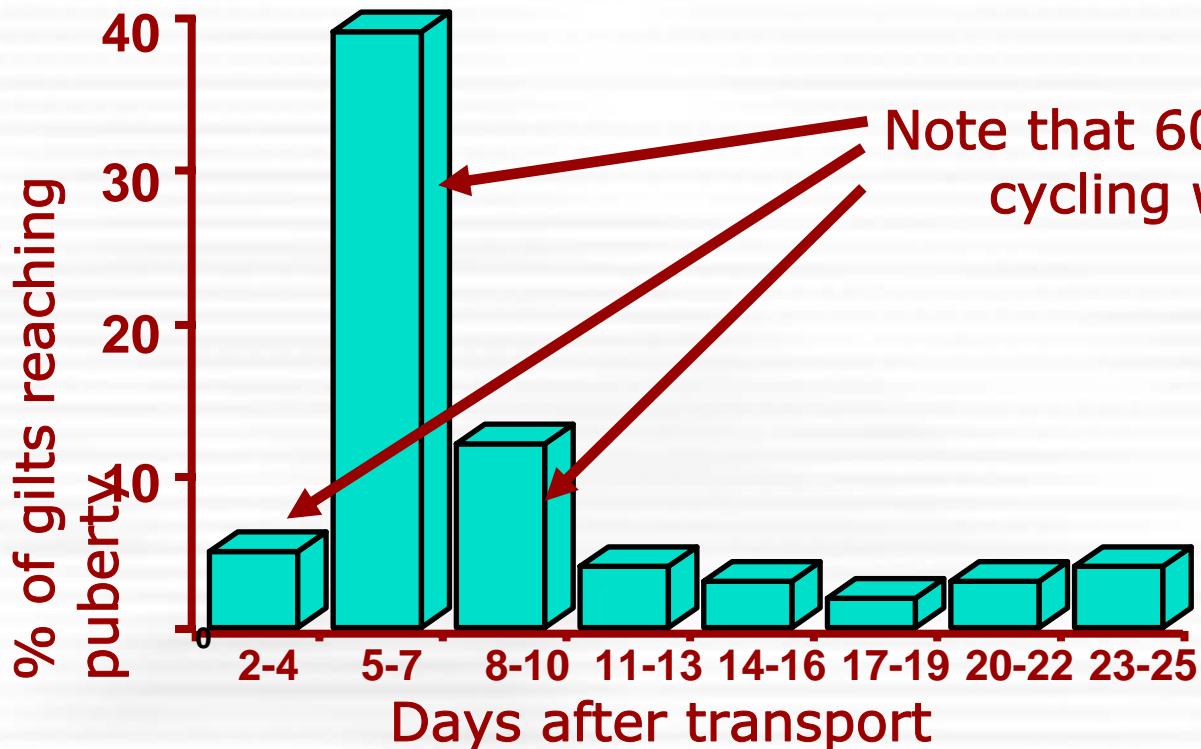


Source: Hughes (1994)



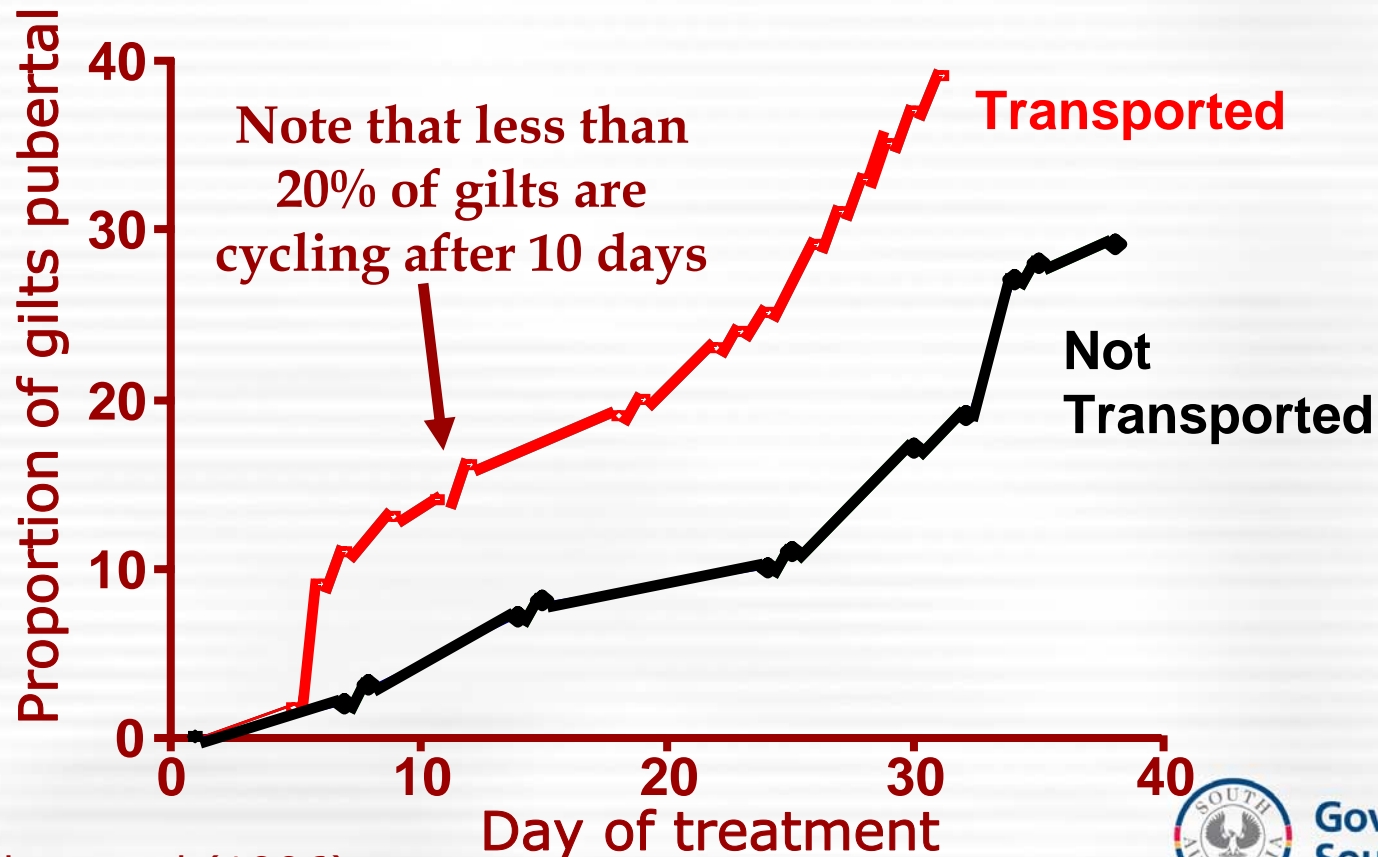
# Stimulating Puberty using Stress

## Transporting OLD GILTS (220-240 Days of Age)



Note that 60%+ of gilts begin cycling within 10 days

## Transporting YOUNG GILTS (160 Days of Age)



Source: Hughes et al (1996)



## Management stressors offer only minor stimulation

| Treatment                              | % pubertal<br>within 10 days |
|--|------------------------------|
| Mixing                                 | 7                            |
| Mixing + Transport                     | 8                            |
| Mixing + Transport + Relocation        | 28                           |
| Mixing + Transport + Relocation + Boar | 87                           |

Source: Zimmerman et al (1976)

# Stimulating Puberty using Exogenous Hormones

The most commonly used hormone preparations for early puberty stimulation in gilts are:

**PG600**<sup>®</sup> - contains PMSG & hCG

**Folligon** – contains PMSG

*followed, 72h later by*

**Chorulon** – contains hCG

## Response of prepubertal gilts (23 wks+) to PG600®

| Source             | Oestrus<br>(%) | Ovulating<br>(%) | Cycling<br>(%) |
|--------------------|----------------|------------------|----------------|
| Paterson 1982)     | 88             | 100              | 87             |
| Paterson (1982)    | -              | 97               | 60             |
| Tilon et al (1995) | 70             | 99               | -              |
| Kirkwood (1999)    | 78             | -                | 67             |

## Effects of gilt weight on PG600 response

|                                  | Heavy gilts | Light gilts |
|----------------------------------|-------------|-------------|
| Oestrus detection rate (%)       | 84          | 70          |
| Interval treatment to oestrus(d) | 6.3         | 7.6         |

Source: Britt et al (1989)

## Folligon/chorulon use in very young gilts

| Age at treatment (weeks) | No. gilts | Boar contact | Pregnant* % |
|--------------------------|-----------|--------------|-------------|
| 18                       | 88        | N            | 12          |
|                          | 96        | Y            | 26          |
| 21                       | 106       | N            | 18          |
|                          | 107       | Y            | 35          |
| 24                       | 95        | N            | 35          |
|                          | 98        | Y            | 55          |

\*Fixed time single AI

Source: Smits et al (2001)

## Conventionally this consists of 2 steps

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**Puberty**

**Mating**

**1. Stimulate puberty**

**2. Mate at a suitable time  
after puberty (2<sup>nd</sup>. oestrus ?)**

**Before deciding when to mate the gilt be aware that she needs to be kept cycling if you're not going to mate her at the pubertal heat.**

## Boar contact and continued cyclicity in gilts

### PG600-induced puberty

| Boar contact | Showing 2 <sup>nd</sup> . oestrus (%) | Having a 2 <sup>nd</sup> . ovulation (%) |
|--------------|---------------------------------------|--|
| YES          | 85                                    | 82                                       |
| NO           | 46                                    | 59                                       |

## Boar contact and continued cyclicity in gilts

### Boar-induced puberty

| Boar contact | Cycles/<br>100 days | Short (<18d)<br>cycles (%) | Long (<25d)<br>cycles (%) |
|--------------|---------------------|----------------------------|---------------------------|
| YES          | 4.9                 | 0                          | 3                         |
| NO           | 3.0                 | 4                          | 31                        |

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# When to mate a gilt ?



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Traditionally, gilts were mated at 2<sup>nd</sup> oestrus as it:

- raised ovulation rate
- possibly improved embryo survival rate

thus facilitating production of a large first litter size

## Gilt ovulation rates

| Source                | Years    | Puberty | 2 <sup>nd</sup> . Oestrus |
|-----------------------|----------|---------|---------------------------|
| Various               | Pre 1960 | 10.7    | 12.0                      |
| Hughes                | 1975     | 12.9    | -                         |
| denHartog & Verstegen | 1980-90  | -       | 13.5                      |
| Van Wettere & Hughes  | 2003     | 14.9    | 15.5                      |

## Ovulation Rates - 21<sup>st</sup>. Century Gilts

Ovulation rates at:

| Started boar contact at: | Puberty | 2 <sup>nd</sup> . Oestrus |
|--------------------------|---------|---------------------------|
| 23 weeks                 | 14.8    | 15.5                      |
| 26 weeks                 | 14.6    | 15.7                      |
| 29 weeks                 | 15.3    | 15.5                      |

van Wettere et al (2006)

## Embryo Survival in 21<sup>st</sup>. Century Gilts

|                             | Puberty | 2 <sup>nd</sup> . Oestrus |
|-----------------------------|---------|---------------------------|
| No. of embryos at 32 weeks  | 11.3    | 12.3                      |
| Embryo survival at 32 weeks | 76%     | 80%                       |

(van Wettere et al (2006))

## At which heat should a gilt be bred ?

|                     | 1 <sup>st</sup> . | 2 <sup>nd</sup> . | 3 <sup>rd</sup> . | 4 <sup>th</sup> . |
|---------------------|-------------------|-------------------|-------------------|-------------------|
| Farrowing rate (%)  | 72                | 87                | 88                | 91                |
| Litter size (total) | 10.1              | 11.3              | 11.4              | 11.4              |

# Gilt Nutrition & Egg Quality

## Feeding x Week of oestrous cycle

| Week 1 | Week 2 | Week 3 | Embryo survival rate |
|--------|--------|--------|----------------------|
| High   | High   | High   | 84%                  |
| Low    | High   | High   | 82%                  |
| High   | Low    | High   | 68%                  |

## Value of using a vasectomised boar

|                                | Control gilts<br>- not mated<br>at 1 <sup>st</sup> . heat | Mated with<br>vasectomised<br>boar at 1 <sup>st</sup> . heat |
|--------------------------------|---|--|
| Farrowing rate*                | 84%   | 90%  |
| 1 <sup>st</sup> . Litter Size* | 9.5   | 10.7   |
| 1 <sup>st</sup> . Litter Size* | 9.0   | 10.1   |

\* All data for 2<sup>nd</sup> heat matings with stock boar



## Advantages of using vasectomised boars

- Boars get regular matings
- No need to supervise boar exposure periods
- Get a further benefit in FR & LS

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# Suggested Gilt Management Framework



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## Suggested Gilt Management Framework

Select gilts  
at 22-23 weeks  
& 100kg+

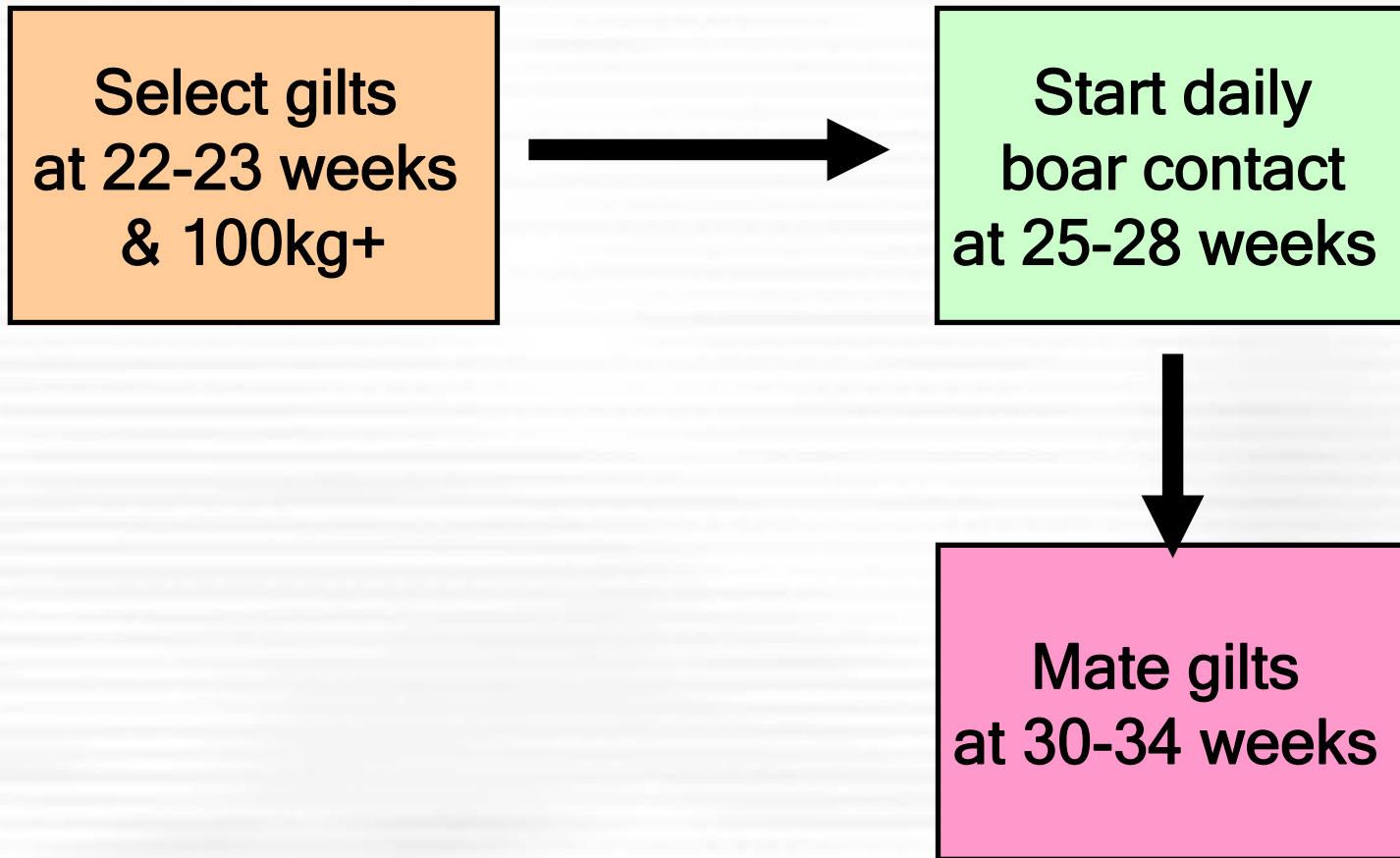
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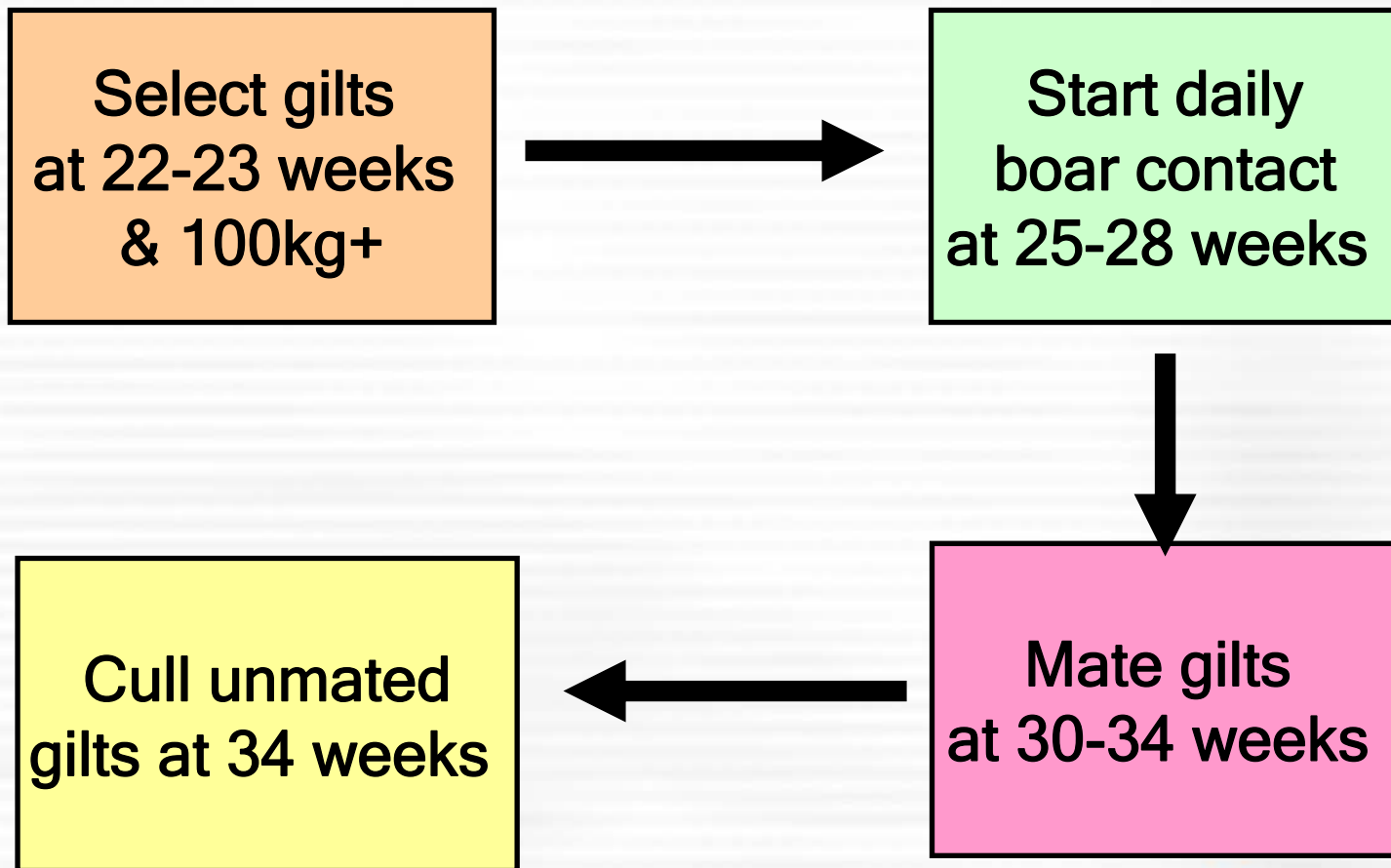


Start daily  
boar contact  
at 25-28 weeks

## Suggested Gilt Management Framework



## Suggested Gilt Management Framework



**What else can we do with gilts after mating to maximise longevity & lifetime performance ?**

# Condition at weaning and subsequent reproductive performance

| Weaning liveweight (kg) | Weaning-to oestrus (d) | Anoestrus (%) | Sub. litter size (total) |
|-------------------------|------------------------|---------------|--------------------------|
| <180                    | 8.2 <sup>a</sup>       | 22            | 9.9 <sup>a</sup>         |
| 180-200                 | 6.1 <sup>b</sup>       | 9             | 11.8 <sup>ab</sup>       |
| >200                    | 6.2 <sup>b</sup>       | 4             | 12.1 <sup>b</sup>        |

a,b: within a category means are sign. diff. (P<0.05)

## Can we feed gilts more in 1<sup>st</sup> gestation?

|                            | <u>Gestation feed level</u> |      |
|----------------------------|-----------------------------|------|
|                            | High                        | Low  |
| Piglet wt gain to d20 (kg) | 3.9                         | 3.6  |
| Sow lact. wt. loss         | 9.6                         | 8.6  |
| Anoestrus %                | 6                           | 3    |
| Wean-oestrus interval (d)  | 5.0                         | 5.5  |
| Sub. litter size (total)   | 9.8                         | 10.1 |

# Can we feed gilts more in 1<sup>st</sup> lactation?

|                            | Lactation feed level |     |
|----------------------------|----------------------|-----|
|                            | High                 | Low |
| Piglet wt gain to d20 (kg) | 3.8                  | 3.7 |
| Sow lact. wt. loss         | 8.4                  | 9.8 |
| Anoestrus %                | 6                    | 3   |
| Wean-oestrus interval (d)  | 5.9                  | 4.6 |
| Sub. litter size (total)   | 10.5                 | 9.5 |

# Lactation Nutrition & Egg Quality

## Lactation feed intake

Weeks 1-3

Week 4

Embryo survival rate

High

High

88%

High

Low

64%

Low

High

87%

## Lactation/Post-weaning Nutrition & Egg Quality

| Lactation Length (d) | Days weaning to remating | Embryo survival rate |
|----------------------|--------------------------|----------------------|
| 12                   | 7                        | 68%                  |
| 12                   | 19*                      | 77%                  |
| 24                   | 6                        | 68%                  |

\*Given Regumate for 12 days after weaning

Koutsotheodoros et al (1998)

## Can we stop gilts mobilising muscle in 1<sup>st</sup> lactation?

|                         | <u>Lactation treatment</u> |         |
|-------------------------|----------------------------|---------|
|                         | Control                    | Paylean |
| Sow lact. wt. loss (kg) | 10.9                       | 6.1     |
| Piglet wt. at d20 (kg)  | 6.3                        | 6.1     |
| Bred by d.10 (%)        | 75                         | 95      |
| Sub. litter size (live) | 8.1                        | 9.5     |

## Can we stop gilts mobilising muscle in 1<sup>st</sup> lactation?

|                           | Litter size suckled |      |
|---------------------------|---------------------|------|
|                           | 7                   | 12   |
| Sow lact. wt. loss (kg)   | 22.9                | 30.1 |
| Wean-oestrus interval (d) | 8.5                 | 10.8 |
| Bred by d.10 (%)          | 75                  | 70   |
| Sub. litter size (live)   | 10.6                | 10.1 |

## Post-weaning Nutrition & Egg Quality

| Pre-mating<br>Feed level | Post-mating<br>Feed level | Ovulation<br>rate | Embryo survival<br>rate |
|--------------------------|---------------------------|-------------------|-------------------------|
| Low                      | Low                       | 19.0              | 73%                     |
| Low                      | High                      | 19.3              | 76%                     |
| High                     | Low                       | 22.4              | 99%                     |
| High                     | High                      | 22.3              | 90%                     |

## Should we delay remating gilts after 1<sup>st</sup> lactation?

|                                | Control | Skip-a-heat |
|--------------------------------|---------|-------------|
| Ovulation rate                 | 19.0    | 19.6        |
| Conception rate (%)            | 893     | 88          |
| No. embryos d.30               | 12.9    | 15.2        |
| Largest follicle diameter (mm) | 7.2     | 8.2         |

Adapted from Foxcroft & Patterson (2010)

## Should we delay remating gilts after 1<sup>st</sup> lactation?

|                        | Control | Regumate<br>-2 to +5d | Regumate<br>-2 to +12d |
|------------------------|---------|-----------------------|------------------------|
| % bred                 | 80      | 75                    | 90                     |
| No. live foetuses d.50 | 12.8    | 12.9                  | 14.0                   |

Adapted from Foxcroft & Patterson (2010)

N.B. Study conducted in hot Summer months

Thank you

