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EAAP 2011 Stavanger, Norway
Session 52: Causes and consequences of mortality and premature culling of breeding animals

Premature Removal and Mortality of Commercial Sows

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Bild 3

MODERN SWINE PRODUCTION

Bild 4

Selection for

- Lean bodies
- Fast growth
- Large litters
- High feed conversion ratio
- Few non-productive days

→ Highly productive animals

Bild 5

Confined Space

Bild 6

Confined Space II

Bild 7

Bild 8

Bild 9

Stressful Environment

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Time

Scheduled farrowing batches

Little or no room for biological variation
or deviations from the time schedule

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RESULT
- how is it today

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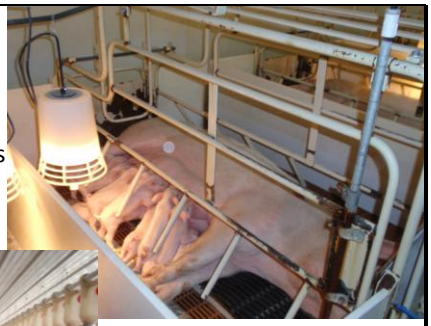
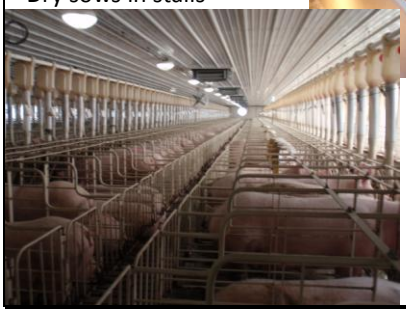
USA

Sows with litter in crates



Dry sows in stalls



Data from:
- 132 farms
- From 1996 to 2007

➢ 515,194 removed sows

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Sweden

Sows with litter in pen

Group housed dry sows

Data from:
- 21 farms
- from 2001 to 2004

➢ 14,234 removed sows

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How many?

If all sows reach 8 parities an annual removal rate of 28% would be necessary for removal of old sows

USA **57%**

Sweden **49%**

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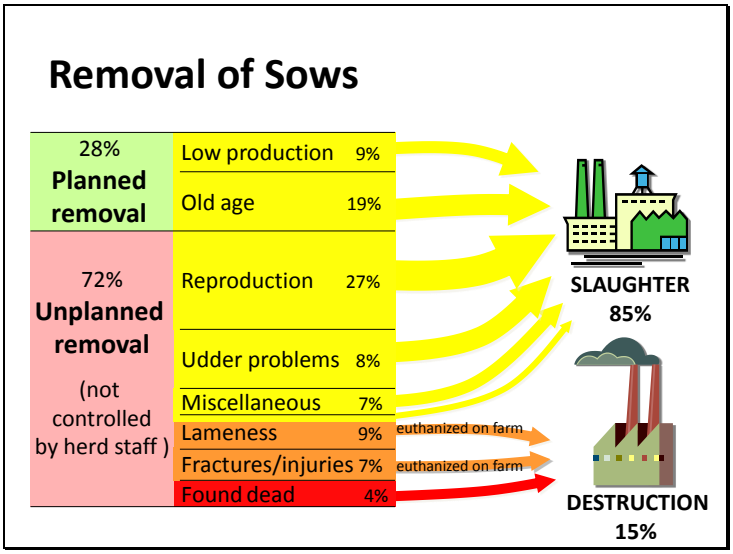

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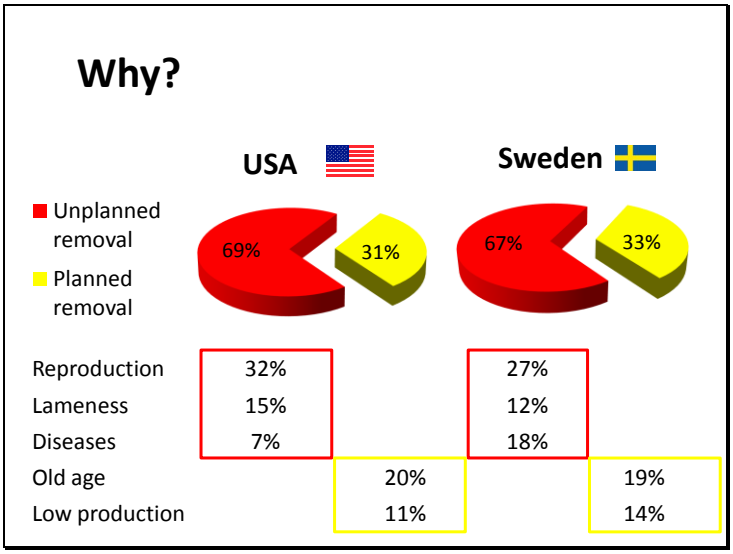

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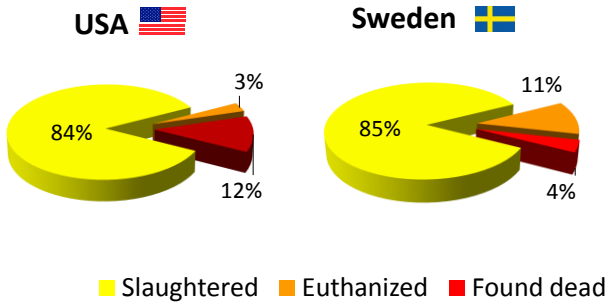
How?



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Why?

Post-mortem examination of 90 sows collected from 1 Swedish commercial farm (Engblom et al., 2008)

Most common mortality causes among the 17 found dead were:	• circulatory/cardiac failure • trauma related injuries
Most common finding among the 79 euthanized were:	• arthritis • osteochondrosis • fracture

In 43% of the cases with “only” arthritis, the clinical symptoms suggested it being a fracture.

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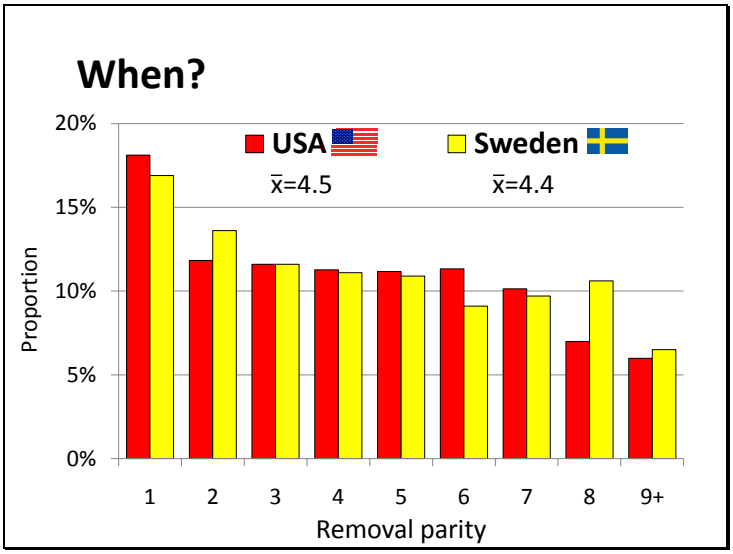

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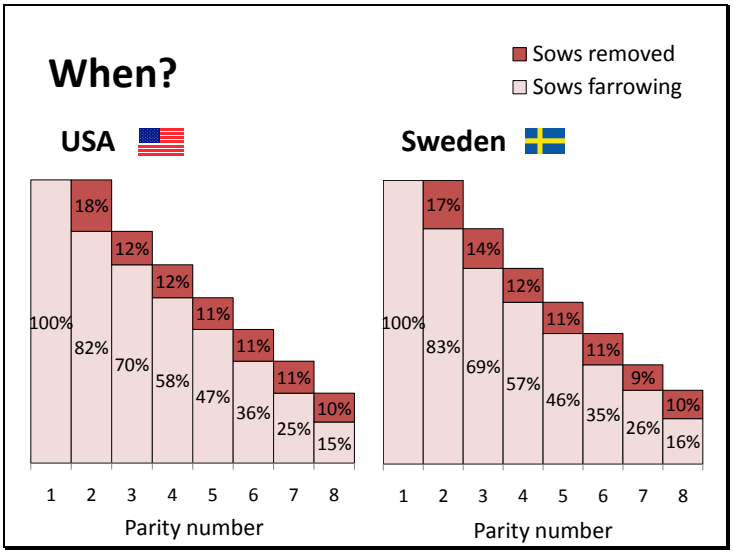

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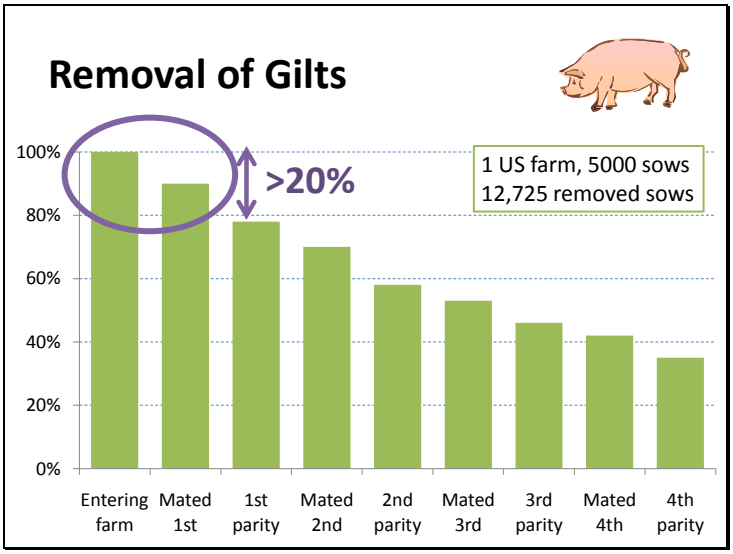

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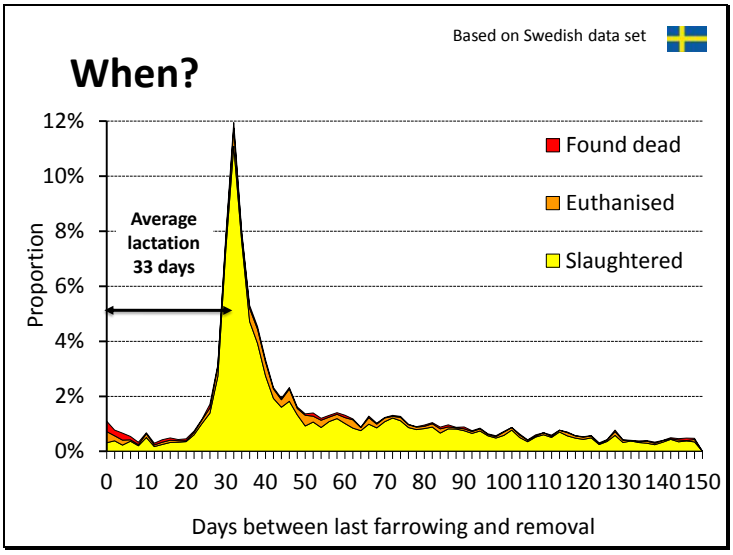

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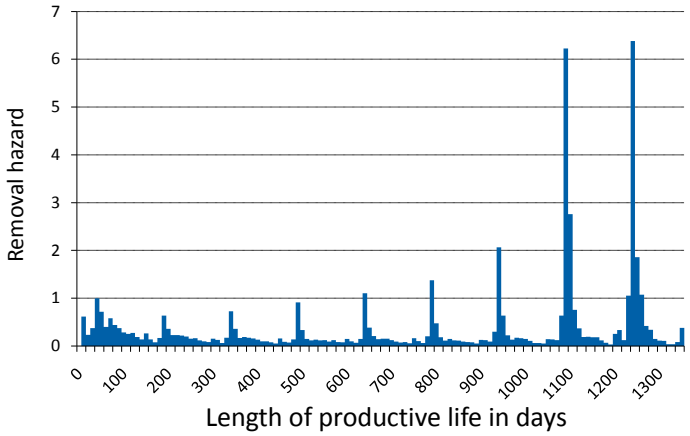
Based on Swedish data set

When?



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Based on Swedish data set

High Removal Hazard

1. Days after farrowing
   - Shortly after weaning
2. Parity
   - In first parity and high parity numbers (>8)
3. Herd year combination
4. Total number of piglets born
   - Farrowing small litters (<9 piglets)
5. Days between weaning and next farrowing
   - Long intervals between weaning and next farrowing
6. Age at first farrowing
   - Old age at first farrowing (>14 months)

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Summary

- High removal rates in both systems
  - Every year every 2nd sow is removed
- Large proportions are removed early
  - 30% removed before parity 3 and less than 50% farrow 5 litters
- Large proportion of unplanned removal
  - 2/3 of the removal
- High proportion death and euthanasia

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Economy

- Production systems with low replacement rates are the most profitable (Faust et al., 1993)
- At least three litters are required for a sow before she gives a positive cash flow for the producer (Lucia et al., 2000; Stalder et al., 2003)

  30% removed before 3rd parity!
- The optimal economic lifespan has been shown to be at least five parities (Scholman et al., 1989; Lucia et al., 2000; Rasmussen, 2004)

  >50% removed before 5th parity!

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Consequences

The high and early removal of sows cause:

- Inferior animal well being
- Lower production level
  - High proportion of gilts
  - Less opportunity to cull low producing sows
- Planning at farm level more difficult
- Risk farm health status if replacement is external

Ethical and economic problem

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WHY

is it like this?

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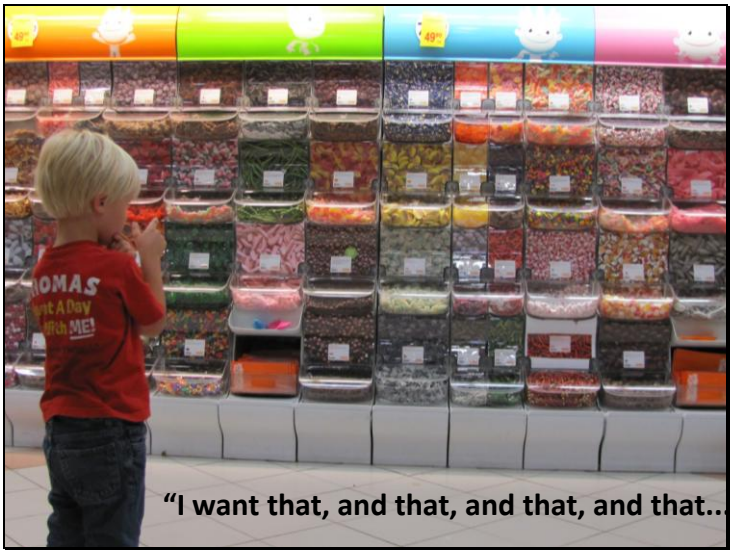

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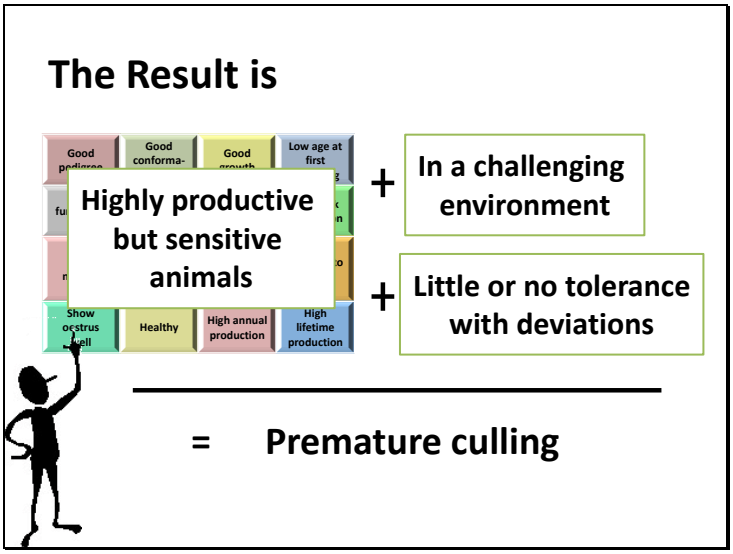

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Our 2 options?

1. Accept the high removal as a part of modern swine production
2. Decide not to accept it, but:

   ...meet the sows need by **improve management, housing, production systems**...

   ...and/or **select for more robust sows** which are more suited to cope with the environment.

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Large Variation between Farms

	USA	Sweden
Annual removal rate	57%	49% **34 - 66%**
Average removal parity	4.5 **2.7 - 7.1**	4.4 **3.4 - 5.7**

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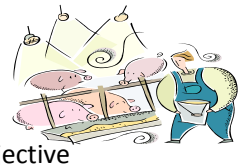
Management



Removal reasons are more or less subjective

- Most sows are removed for reproductive disorders
  - Studies have shown that sows removed for reproductive disorders often have
    - normal genital organs (Tummaruk et al., 2009; Knauer et al., 2007; Einarsson et al., 1974)
    - which continued to be active (Karveliene and Riskeviciene, 2009)

→ Improved management can reduce removal e.g. enough time and skill for oestrus check

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Housing and Production Systems

- Housing and production system influence removal pattern of sows (Morris et al., 1998; Akos and Bilkei, 2004)
- Sows kept only on or partially on slatted floors during gestations were likely to have higher annual removal rate (D'Allaire et al., 1989)
- Sows with lactation length (LL) of 15 to 19 days had 3.5 days higher odds of a return to oestrus than sows with LL of 20 to 21 days (Vargas et al., 2009)

→ Improved housing and production systems can reduce removal

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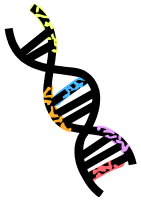
Selection for Sow Longevity

- Longevity heritabilities reported from 0.1 to 0.4
  (López-Serrano et al., 2000; Serenius and Stalder, 2004; Heusing et al., 2005; Engblom et al., 2009)
- Selection can be an efficient way to improve sow longevity (Heusing et al., 2005; Serenius et al, 2006 and Tarrés et al, 2006)
- Improved genotype ought to be beneficial in all environments
- But rarely included in breeding evaluations



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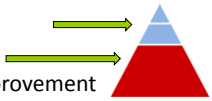
A Challenge to Breed for

- Definition (stayability, parity, lifetime, lifetime production)
- Not a normally distributed trait
- Expressed late in life
  - Many factors influence
  - Long time data collections

$$\Delta G/\Delta t=[r_{G\hat{G}}\cdot i\cdot\sigma_G]/L$$

- Possibly different trait in nucleus and commercial farms
  - Does traditional selection lead to improvement among crossbred sows in commercial farms?



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3 Breeding Companies

TOPIGS: Stayability (0/1) to 1st parity
Parity number (up to parity 5)

DanBred: Leg strength
Stayability (0/1) from insemination of gilts to insemination for 2nd parity

PIC: Stayability (0/1) to 4th parity

"A long way to go"

"The last trait"

"Crazy trait"

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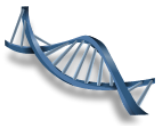
New Techniques



Recent studies have found lifetime production associations with QTL regions (Onteru et al., 2011), and SNPs (Rempel et al., 2010) and that it can be improved by using molecular markers for marker-assisted selection (Mote et al, 2009)

This will be a good way to select young females for superior reproductive performance, but...

Not there yet....

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Conclusions

take home message

- Every year every 2nd sow is removed
- Improvements necessary in
  - management
  - housing and production systems
  - genetics

Data collection from commercial farms

Animal well-being and production level

Worker morale, and producer profitability

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NEWS AND FUTURE

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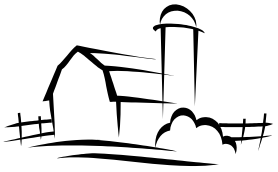
Recent Studies



Variation between Herds

- High-performing herds had lower culling rates in parities 2 to 5 and higher culling rates in parities 6 and ≥7 than lower performing herds (Koketsu and Yosuke, 2009)
- A huge variation between herds were observed in prevalence of lameness and claw lesions (Pluym, 2011)

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Claws, Legs and Lameness

- No differences were fond between Leg structure score groups for hazards of culling (Kaneko et al, 2009)
- Significant differences in the survival of lame and non-lame sows in a commercial herd (Anil et al., 2009)
- Lameness significantly increased the risk of sows to be involuntary culled (Jensen et al., 2010)
- Lameness decreased while the mean claw lesions score increased with ageing (Pluym et al., 2011)
- Claw lesions did not influence the overall culling risk (Enokida et al., 2011)

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Feeding and Management

- Higher weight gain from first insemination to first weaning was associated with lower non-pregnancy at 2nd parity (Hoving et al., 2010)
- Inadequate sow nutrition contributed to high culling rates in Australia, but the main problem were gilt management. Gilts represented 45.2% of the culling. (Hughes et al., 2010)

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Loose Housed Dry Sows in EU

Loose housing systems for dry sows in the European Union from 2013 (91/630/EEC)

Many possible housing systems (Pluym et al., 2011)

- free access stalls
- pens with electronic sow feeders
- trickle feeding
- floor feeding
- individual feed stalls

Focus on sow removal important!

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