UNIVERSITEIT GENT

FACULTY OF BIOSCIENCE ENGINEERING

The influence of *n*-3 polyunsaturated fatty acids in the feed of the sow on parturition characteristics and piglet viability

Session 25

Tanghe Sofie, Missotten Joris, Vangeyte Jürgen, Claeys Erik and De Smet Stefaan

Email: stanghe.tanghe@ugent.be

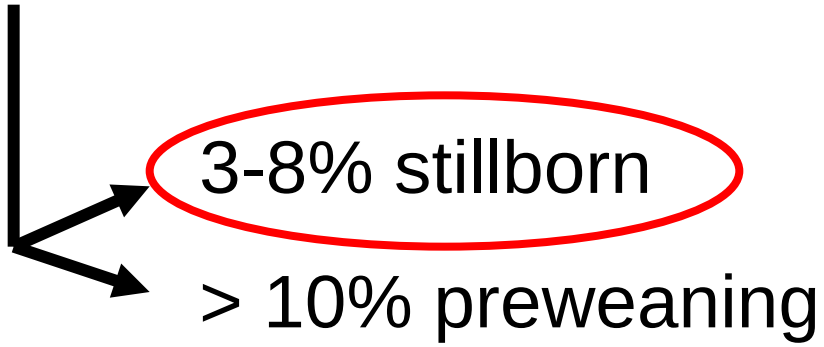
Ghent University

Laboratory for Animal Nutrition and Animal Product Quality

Member of the Food2Know network – www.food2know.be

Introduction

- Intensive pig production
  - Increasing litter size
  - BUT: 10-20% die before weaning (Rooke *et al*., 1998)



Introduction

3-8% stillborn

75% die during parturition due to

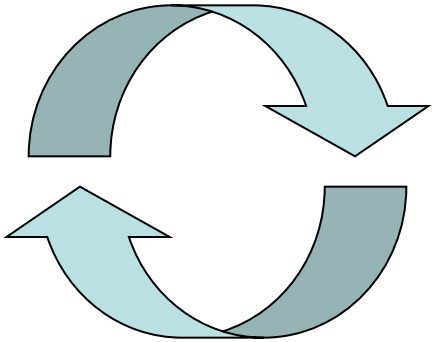
ASPHYXIATION (van der Lende *et al*., 2001)

- total number of piglets born
- position in birth order
- duration of farrowing

Introduction

> 10% preweaning

- Crushing
- Starvation
- Infections



Hypothermia

Vitality is important → COLOSTRUM

Introduction

- To improve **vitality**:

  n-3 polyunsaturated fatty acids **(*n-3* PUFA)** in the diet of the sow (Rooke *et al*., 1998)

Omega-6

Linoleic acid

↓

Arachidonic acid

Omega-3

Alpha-linolenic acid (ALA)

↓

EPA

DHA

Health

Growth

Development

Aim of the study

- *n-3* polyunsaturated fatty acids:
  - Parturition characteristics
  - Piglet viability

Linseed oil: ALA (C18:3*n-3*)

Fish oil: EPA (C20:5*n-3*) + DHA (C22:6*n-3*)

Experimental design

From day 45 in gestation and during lactation 12 sows per group received the experimental diets:

Farm I → **Control diet**: Palm oil (20-23.5 g/kg)

→ **PUFA diet**: Linseed oil (5 g/kg) + Fish oil (10 g/kg)

Farm II → **Control diet**: Palm oil (20-23.5 g/kg)

→ **PUFA diet**: Linseed oil (5 g/kg) + Fish oil (5 g/kg)

Experimental design

- Cameras: parturition was recorded
  - Time of **birth**
  - First attempt to **stand up**
  - Time to reach the **udder**
- **Duration** of parturition (time between birth of first and last piglet)
- Time **interval** between successive births

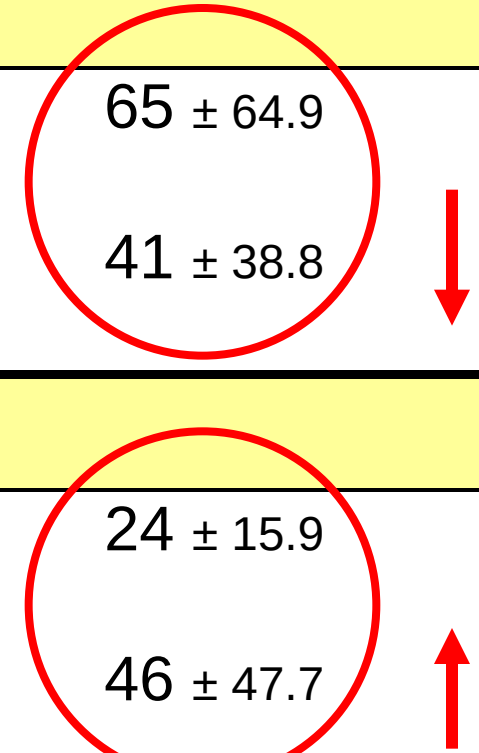
Production results

	Total number of piglets born (mean ± stdev)	**Stillborn piglets** (mean ± stdev)
Farm I		
Palm oil (n = 91)	13.0 ± 3.25	0.9 ± 1.21
0.5% linseed oil + 1% fishoil (n = 71)	13.4 ± 3.29	1.2 ± 1.43
Farm II		
Palm oil (n = 80)	13.1 ± 1.98	1.5 ± 1.47
0.5% linseed oil + 0.5% fishoil (n = 76)	13.4 ± 2.87	1.2 ± 1.27

No significant differences between diets within farms

Piglet viability

	Birth – Standing up (seconds, mean ± stdev)	Birth – Udder reaching (minutes, mean ± stdev)
Farm I		
Palm oil	65 ± 64.9	22.2 ± 42.12
0.5% linseed oil + 1% fishoil	41 ± 38.8	15.3 ± 19.66
Farm II		
Palm oil	24 ± 15.9	37.6 ± 35.98
0.5% linseed oil + 0.5% fishoil	46 ± 47.7	20.1 ± 26.34



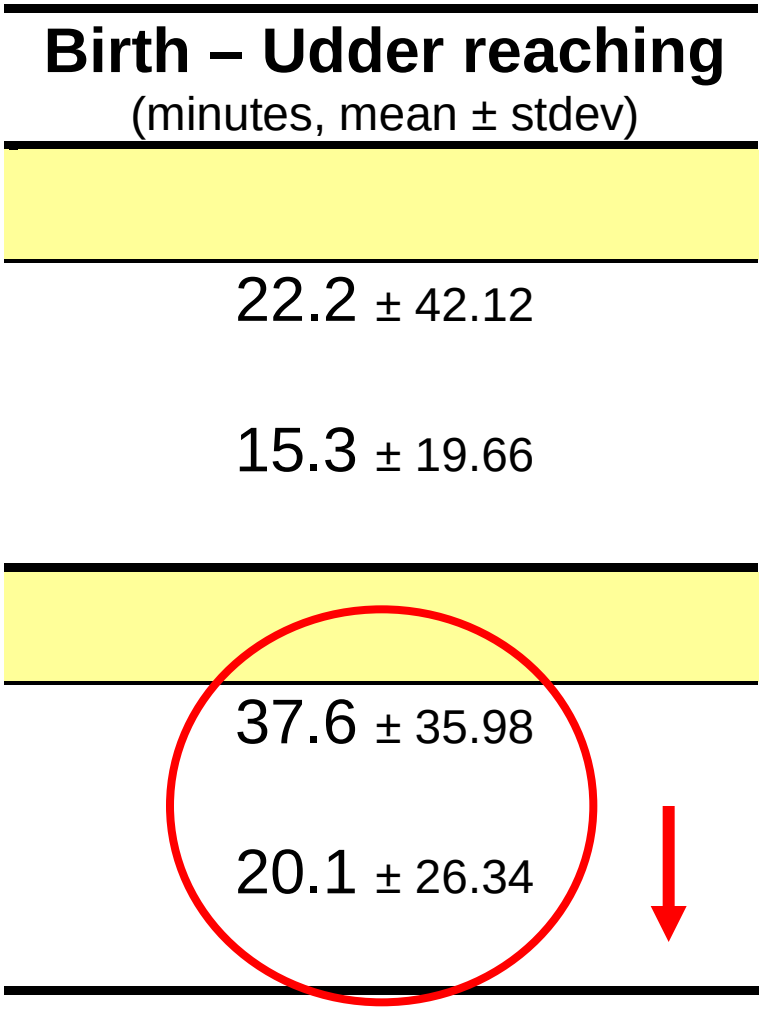
Piglet viability

	Birth – Standing up (seconds, mean ± stdev)	Birth – Udder reaching (minutes, mean ± stdev)
Farm I		
Palm oil	65 ± 64.9	22.2 ± 42.12
0.5% linseed oil + 1% fishoil	41 ± 38.8	15.3 ± 19.66
Farm II		
Palm oil	24 ± 15.9	37.6 ± 35.98
0.5% linseed oil + 0.5% fishoil	46 ± 47.7	20.1 ± 26.34

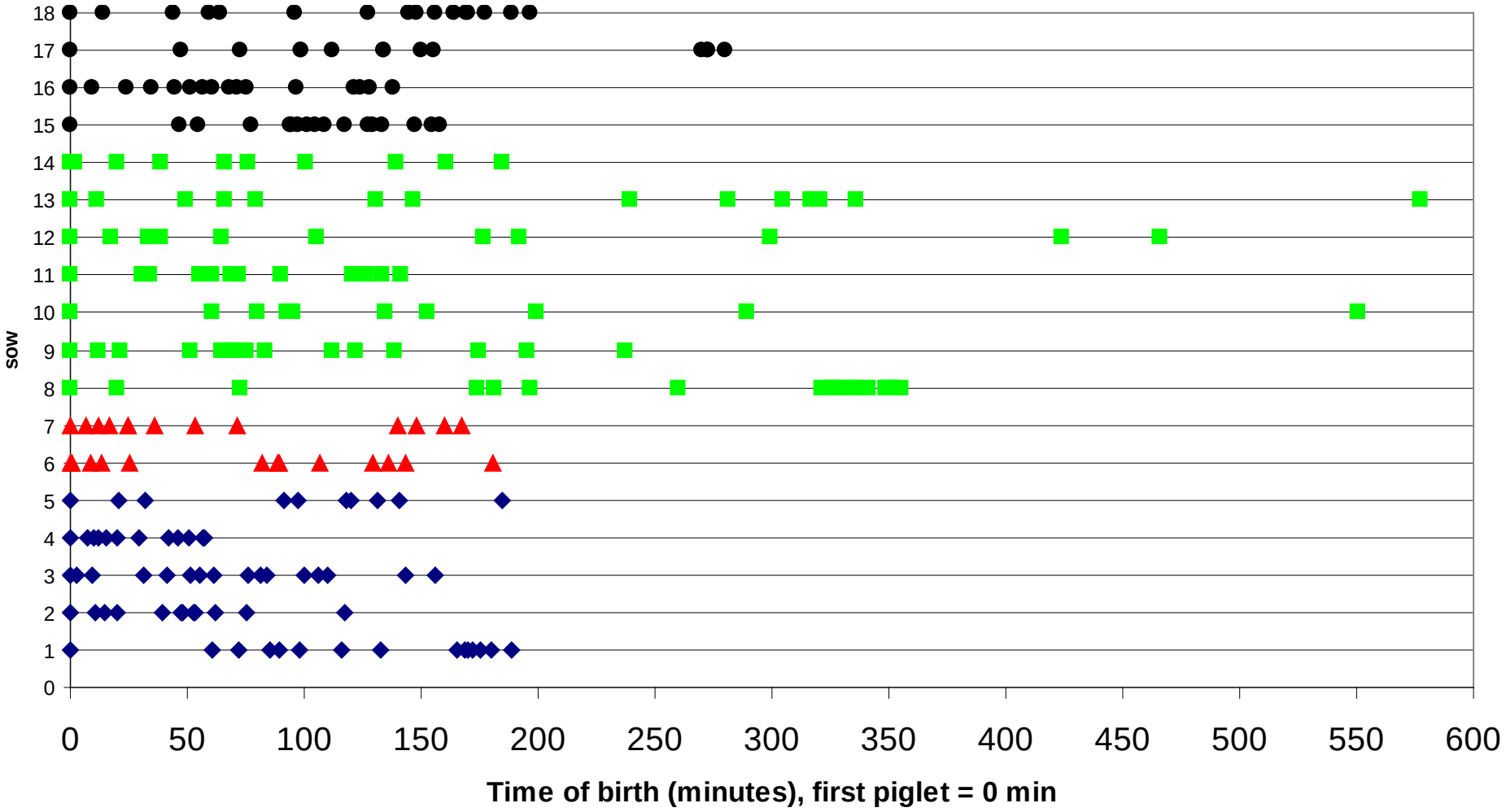
Piglet viability

Herpin *et al*., 1996: **32 ± 32.7 min**

Casellas *et al*., 2004: **24 ± 27.3 min**

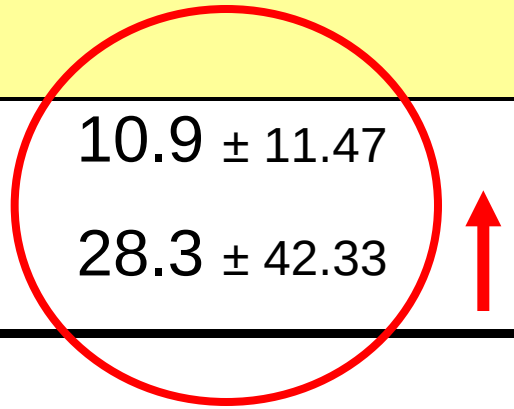


Farrowing process



Parturition characteristics

	Birth interval (minutes, mean ± stdev)
Farm I	
Palm oil	10.3 ± 11.84
0.5% linseed oil + 1% fishoil	11.6 ± 15.48
Farm II	
Palm oil	10.9 ± 11.47
0.5% linseed oil + 0.5% fishoil	28.3 ± 42.33

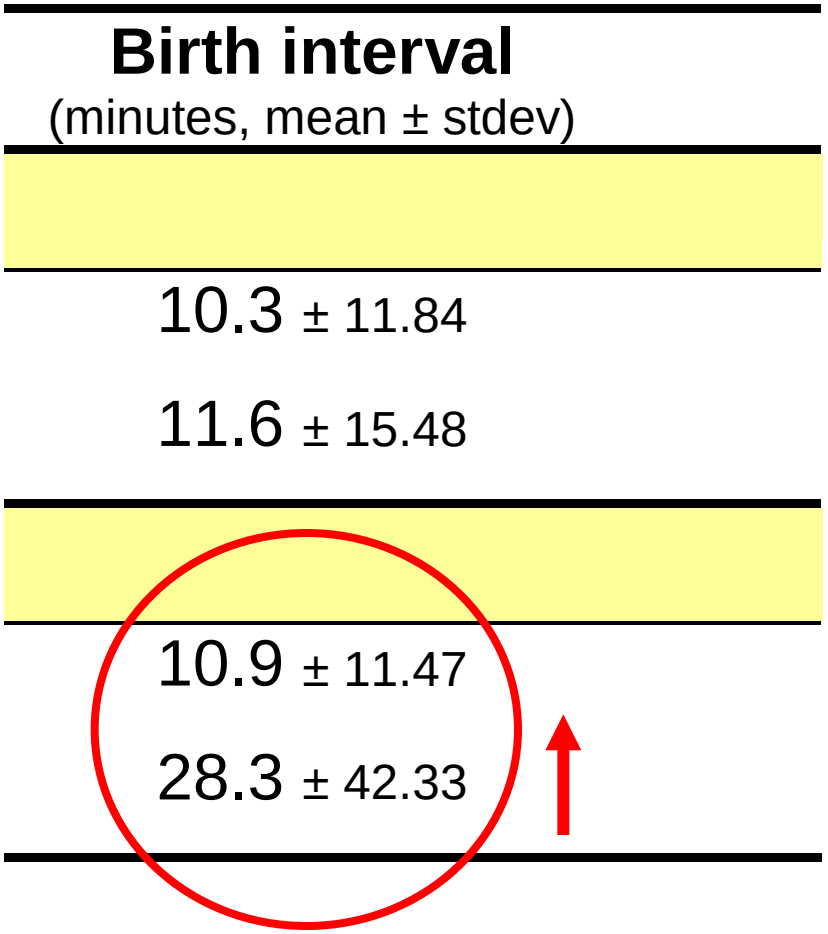


Parturition characteristics

Average birth interval:

14.9 – 28.5 min

(van Rens & van der Lende, 2004; van Dijk *et al*., 2005)



Parturition characteristics

	Duration of farrowing (minutes, mean ± stdev)	Minimum (minutes)	Maximum (minutes)
Farm I			
Palm oil (n = 2)	173.7 ± 9.49	167.0	180.4
0.5% linseed oil + 1% fishoil (n = 4)	193.1 ± 62.91	137.9	280.1
Farm II			
Palm oil (n = 5)	140.6 ± 54.71	57.2	188.3
0.5% linseed oil + 0.5% fishoil (n = 7)	359.0 ± 177.27	141.2	577.7

Parturition characteristics

	Duration of farrowing (minutes, mean ± stdev)
Farm I	
Palm oil (n = 2)	173.7 ± 9.49
0.5% linseed oil + 1% fishoil (n = 4)	193.1 ± 62.91
Farm II	
Palm oil (n = 5)	140.6 ± 54.71
0.5% linseed oil + 0.5% fishoil (n = 7)	359.0 ± 177.27

Average duration of farrowing:

130 – 355 min

(van Rens & van der Lende, 2004; van Dijk *et al*., 2005; Oliviero *et al*., 2010)

Conclusion

- *n-3* PUFA in diet of sow
  - – may reduce: time interval birth – udder reaching

    Viability of piglet
  - – may increase:
    - Birth interval
    - Duration of farrowing

  Stillborn? ⟶ Not in results

Thanks to the Flemish Institute for the Promotion of Innovation by Science and Technology in Flanders (IWT) and several companies for contributing to this investigation