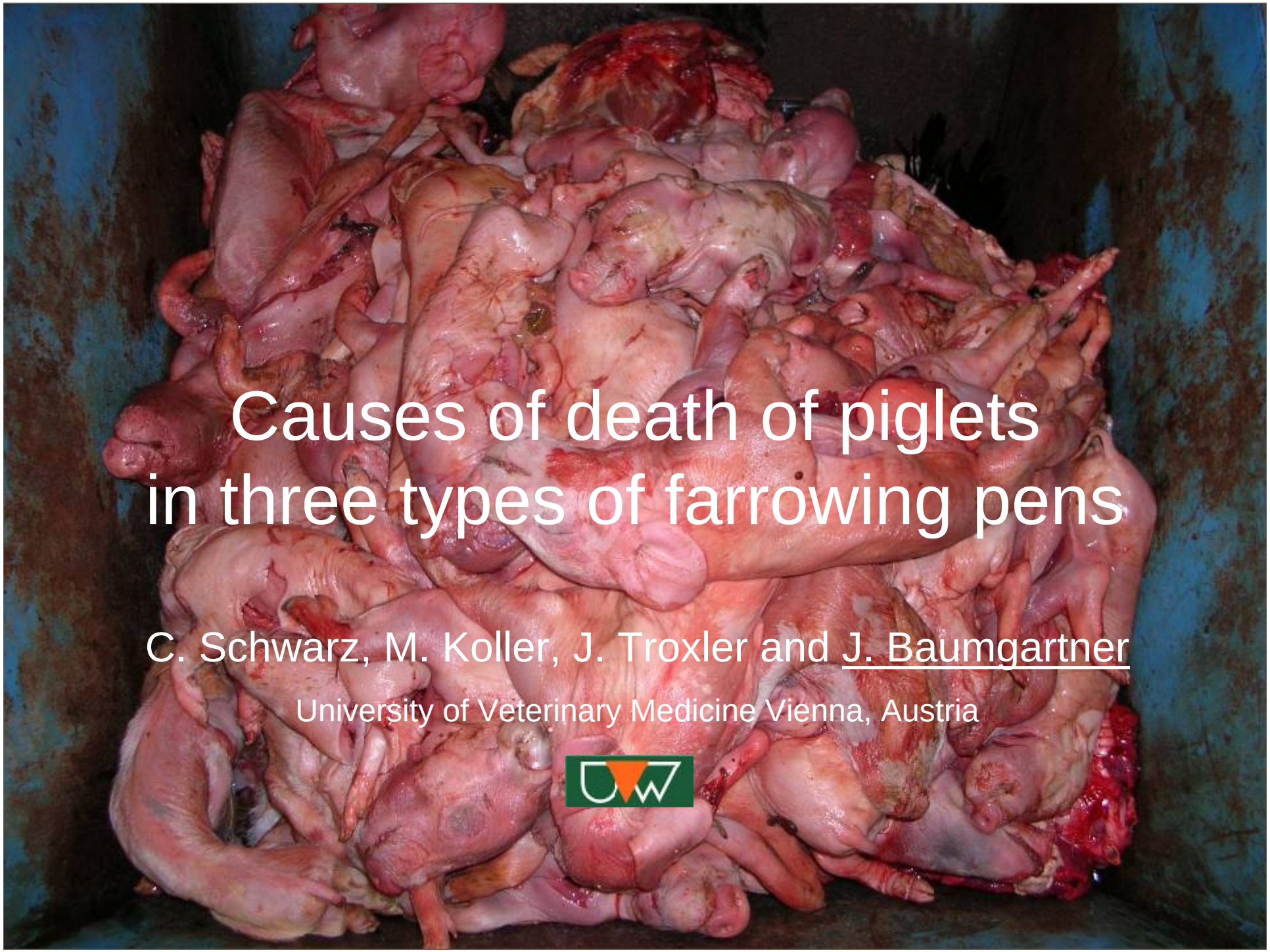

Causes of death of piglets in three types of farrowing pens

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Background

Pre-weaning piglet mortality

- Evolutionary strategy — Edwards, 2002
- Economic relevance — Weary et al., 1998
- Ethical issue

Farrowing crate and free farrowing pen

- Sow welfare — Jarvis et al. 2002; Damm et al. 2003
- Crushing of piglets — Marchant et al. 2000; Weber et al. 2007

Aim

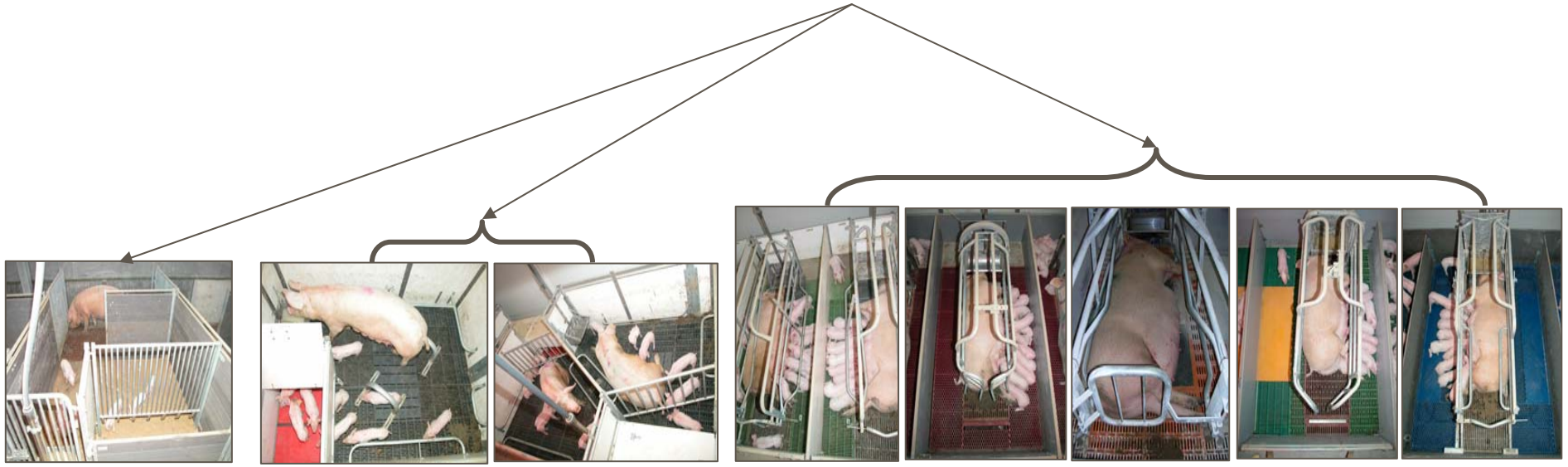
To evaluate cause of death of piglets raised in different farrowing systems by post-mortem analysis

To determine the effect of production conditions and animal based aspects on cause of death

Method - Housing

Commercial farm

- 600 sows (LR x LW)
- Batch farrowed in 5 groups, 4 weeks cycle
- Weaning at 3 weeks
- Different management at farrowing
- 8 farrowing pen types (n=103) → 3 farrowing systems

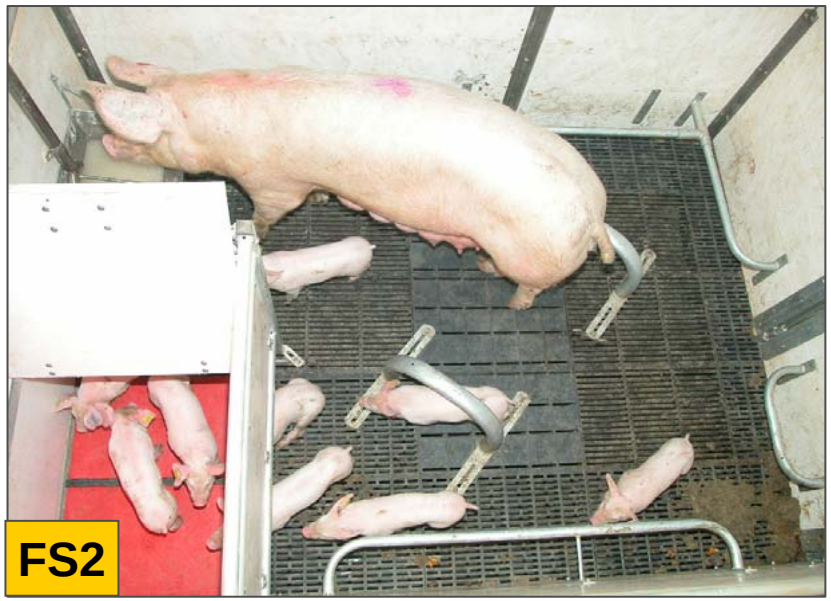


Free Farrowing System – Enriched

FS1

- 7.6 m²
- Lying area with concrete floor ❸
- Dunging area with slatted floor ❹
- Covered creep area ❶
- Minimum of straw
- Additional drinker
- Anti-crushing bars

Free Farrowing Systems – Fully Slatted



- 4.94 m², retangular
- Bars to control lying of sows

- 4.18 m²
- Trapezoid

No straw

Fully slatted floor

No separate dunging area

Covered creep area

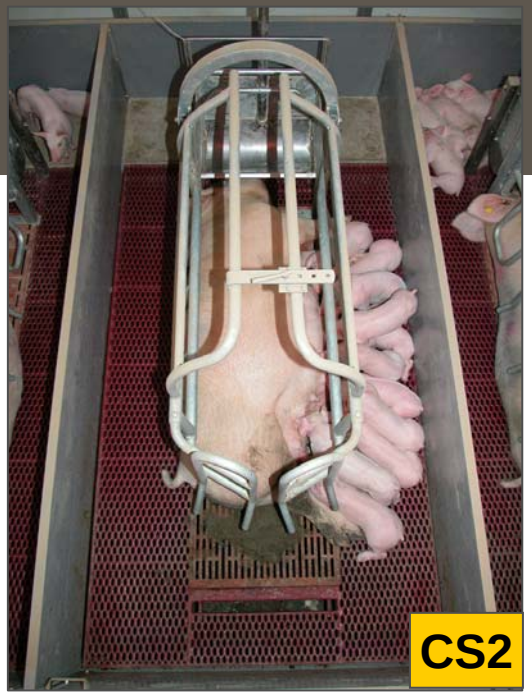
Anti-crushing bars

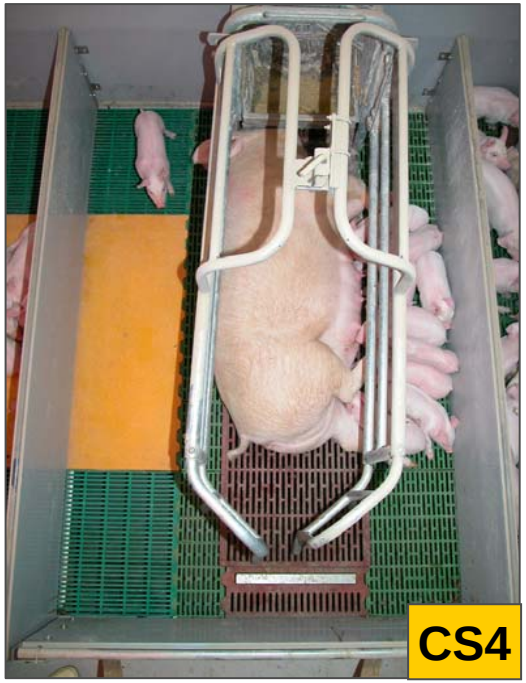
Crate Systems

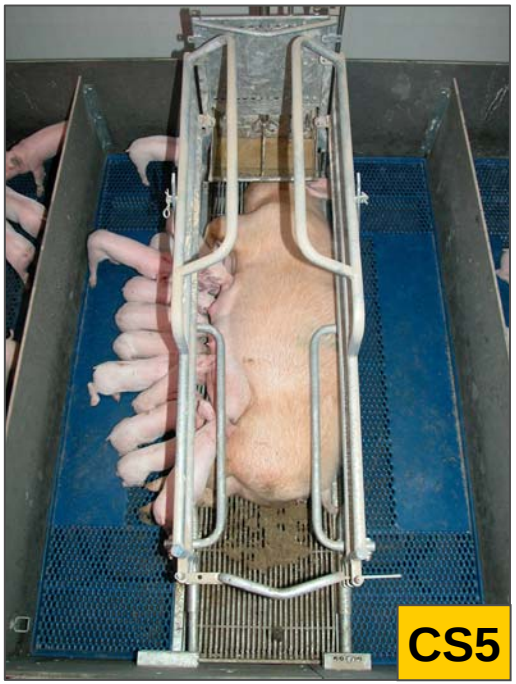
No straw

CS1-CS5 vary in:

- Dimensions
- Floor type
- Crate type
- Creep area







Method - Animals

- Examination of piglets that died in experimental pens
- Incomplete bloc design
- Shock freezing of perished piglets
- Defrosting and post mortem analysis

Farrowing System	Pigs	Litters
FS1	156	40
FS2+FS3	351	106
CS1-CS5	575	262
Total	**1082**	**408**

Method - Post mortem analysis

Basic data

- Sex, body weight, BCS, euthanised

Adspection

- Signs of trauma, congenital defects

Dissection

- Lungs, digestive tract, visceral cavities

Diagnosis - Cause of Death

Method - Diagnoses

1. Stillbirth
2. Crushing
3. Low viability (<4d)
4. Starvation & disease (≥4d)
5. Other
   - Death immediatly after birth
   - Congenital defect
   - Traumatic injury
   - Prolapsus after castration
   - No diagnosis
   - Not evaluable

Method - Statistic

Logistic regression analyses

Dependend variable: number of piglets with a certain cause of death

Independent variables:

- **Farrowing system**
- Management at farrowing (low or high input)
- Parity number, number of born piglets per litter
- Time of birth, deviation from calculated birth date
- Age at death, sex, body weight and BCS (1-3)
- Stomach content
- Ambient temperature (first 3 d post partum)

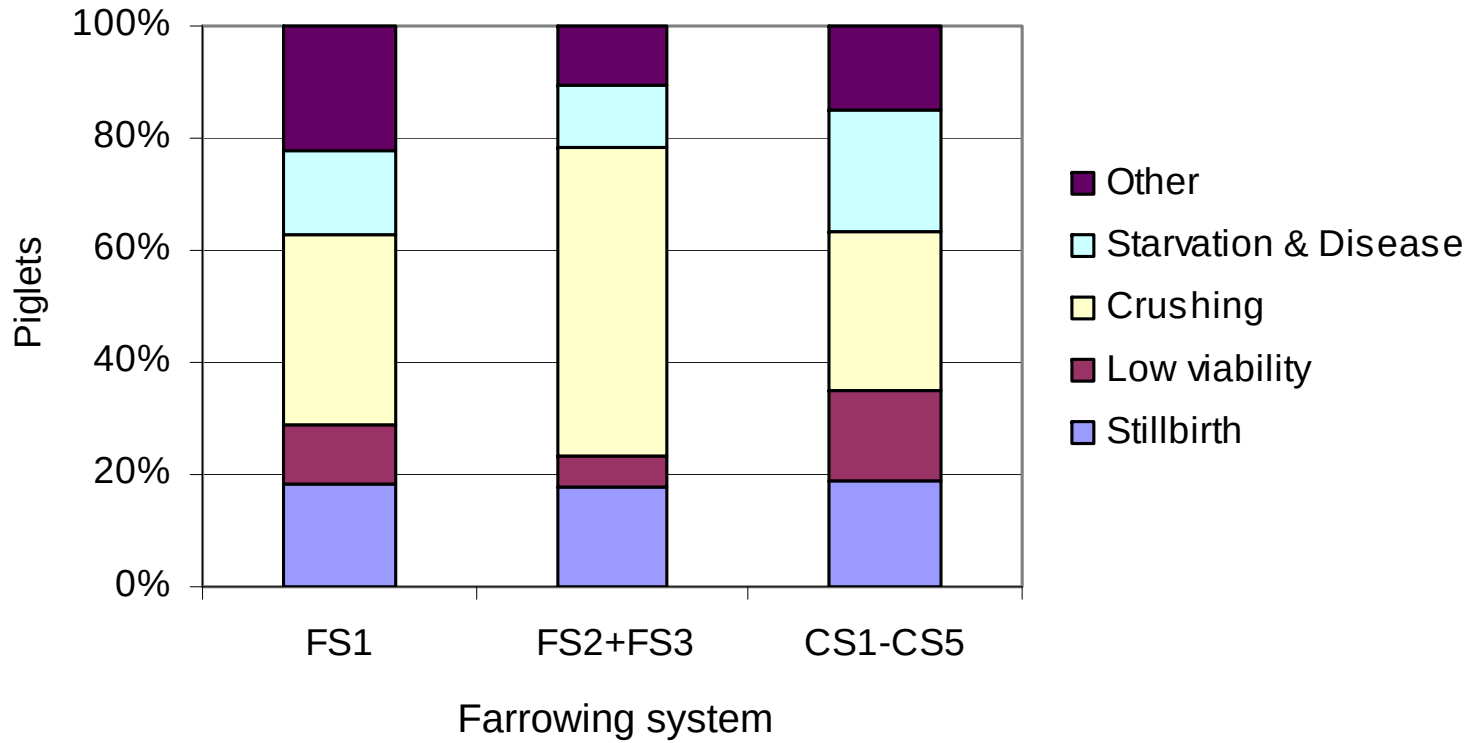
SAS® 9.1.3: backward elimination; $p<0,05$; Goodness-of-Fit Test (Hosmer&Lemeshow); 2LogLikelihood; max-rescaled R^2

Results

Cause of Death	N	%
Stillbirth	200	18,5
Crushing	411	38,0
Death immediatly p.p.	19	1,8
Low viability	127	11,7
Starved	90	8,3
Congenital	31	2,9
Disease	96	8,9
Trauma	21	1,9
Prolaps post castr.	3	0,3
No diagnose	84	7,7
Total	**1082**	**100**

2/3 of evaluated piglets died at birth or within first 3 days p.p.!

Farrowing system and cause of death



Farrowing Pen Type	*Pigs*	*Litters*	Stillbirth	Low viability	Crushing	Starvation	Other
FS1	*156*	*40*	29	16	53	23	35
FS2 + FS3	*351*	*106*	63	19	193	39	37
CS1 - CS5	*575*	*262*	108	92	165	124	86

Results – Effect of farrowing system

	Crushing		Low Viability		Starvation & Disease	
Farrowing Type	OR	p	OR	p	OR	p
FS1 vs FS2+FS3	0,62	0.132	1,3	0,521	1,22	0,633
FS1 vs CS1-CS5	1,77	0,043	0,54	0,072	0,4	0,011
FS2+FS3 vs CS1-CS5	2,84	<0,001	0,42	0,004	0,33	0,001

- Higher probability for crushing in free farrowing systems
- Higher probability for low viability and starvation in crates
  - No significant system effect for stillbirth

Results – ‚Crushing model'

Effect	p
Farrowing System	<0,001
Parity number	0,03
Sex	0,027
BCS	<0,001
Content of stomach	0,006
Age at death	<0,001
Ambient temperature	0,001

Effect		OR	SE	p
System	FS1 vs FS2+FS3	0,62	0,20	0,132
System	FS1 vs CS1-CS5	1,77	0,50	0,043
System	FS2+FS3 vs CS1-CS5	2,84	0,74	<0,001
Parity number	1 vs 3	0,46	0,18	0,05
Parity number	1 vs 6	0,32	0,11	0,001
Sex	male vs female	0,62	0,13	0,027
BCS	1 vs 2	2,44	0,62	0,001
BCS	1 vs 3	17,15	5,28	<0,001
BCS	2 vs 3	7,03	1,95	<0,001
Stomach	empty vs amniotic liquor	2,74	1,20	0,022
Stomach	milk vs amniotic liquor	4,07	1,78	0,001

Conclusion

- Free farrowing systems have to be improved
- Selecting for good mothers and piglets of high vitality
- Litter size ?

Thank you for your attention !

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