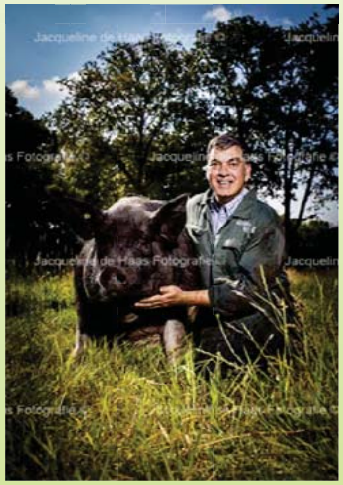
Colostrum: a key component of diarrhoea prevention

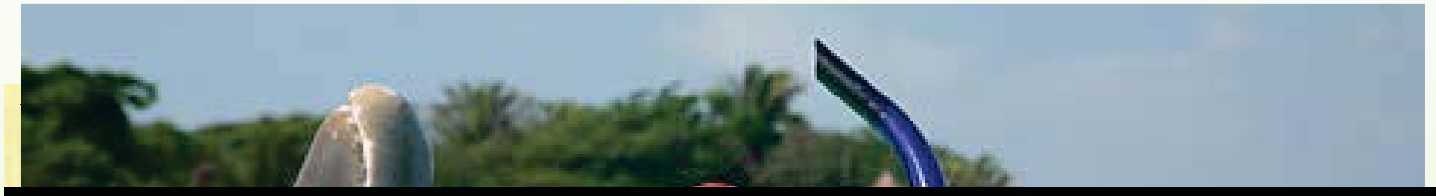
Welcome to the swine veterinarians invited by Boehringer Ingelheim

Dr. Kees Scheepens
‚the pig whisperer'



12th of Octobre 2016

How intelligent is the pig? What position?



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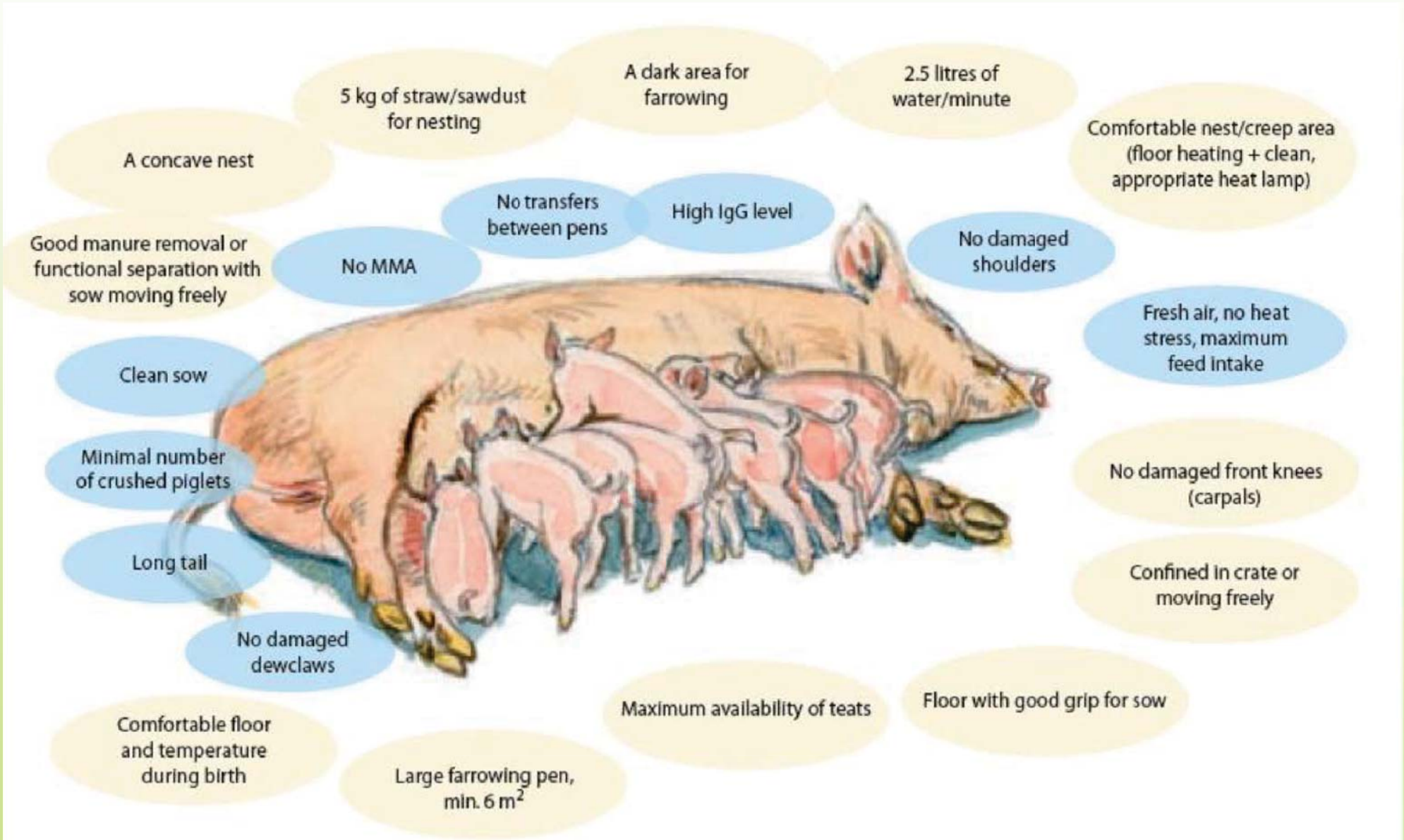
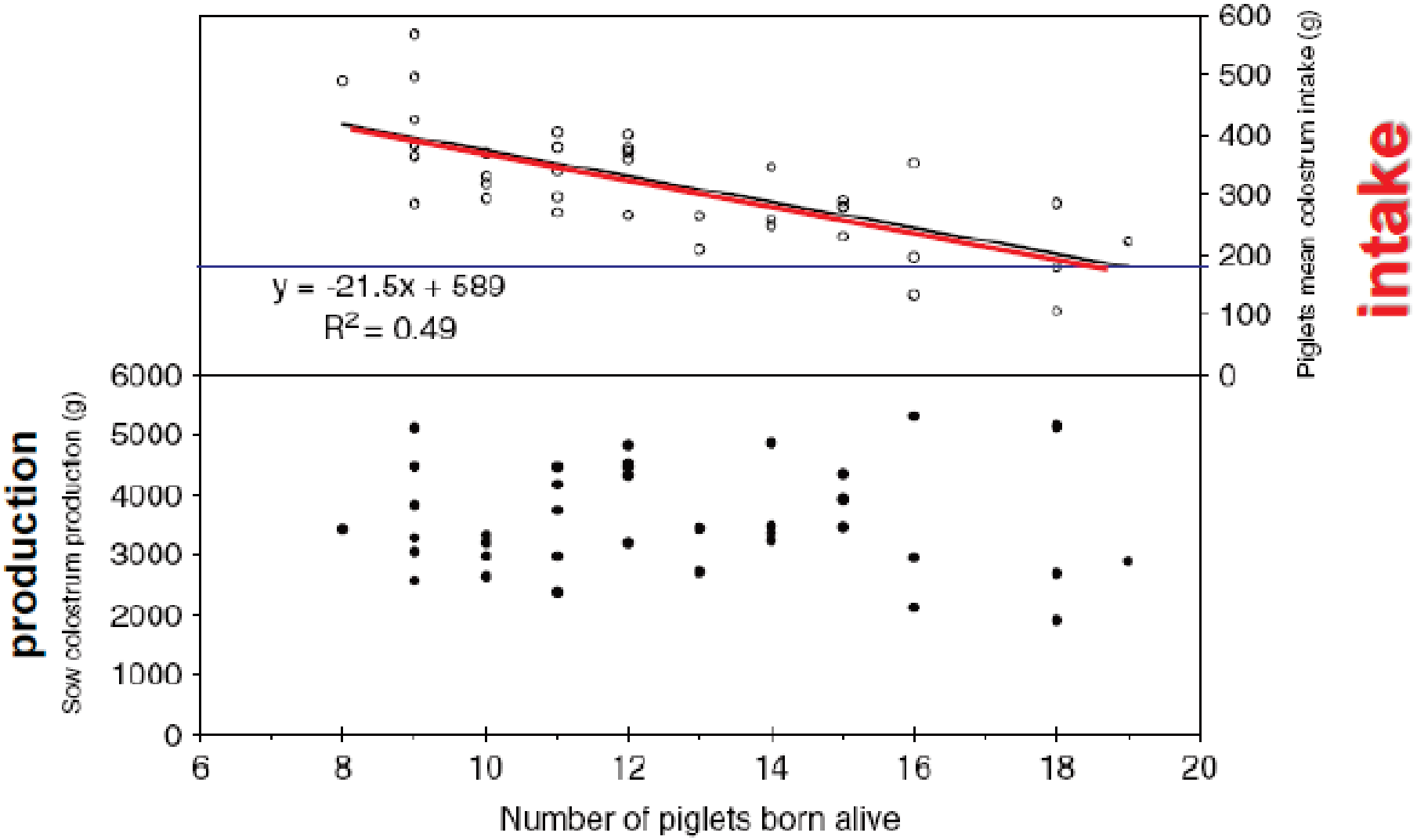
At the glimmer of daylight



Sow – colostrum - piglet



Long labour

AHA?

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Delayed suckling?

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Effects of long labour

- Piglets clamped in uterus/vagina
- Hypoxia:
  - Lower pH, high lactate and high [CO_2] in blood
- Resulting in: decreased vitality piglets
  - Delay in standing up
  - Double time to reach udder of sow
  - Body-temperature lowered by 2 degrees

HYPOXIA CONTINUES AFTER BIRTH !!!

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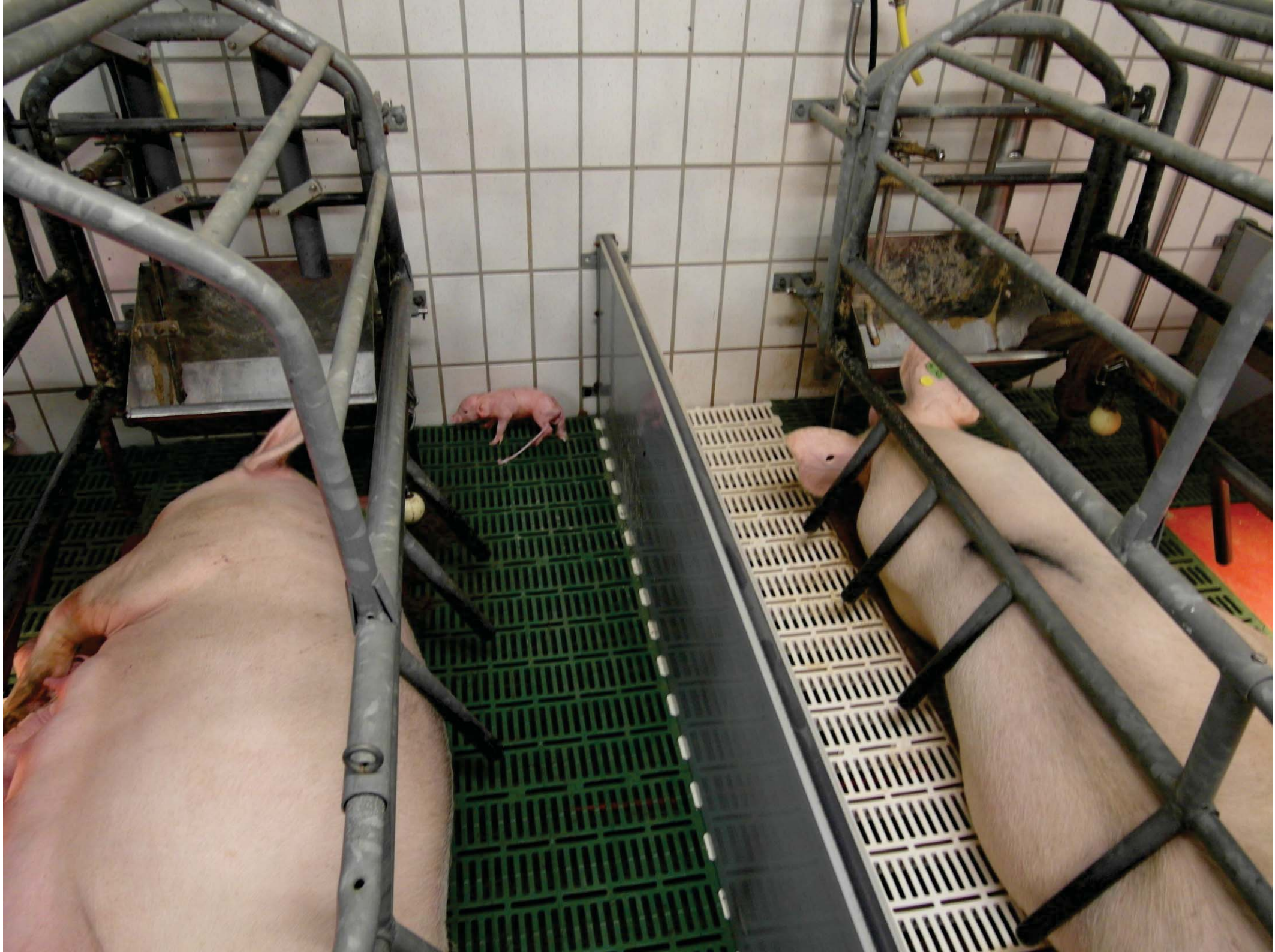


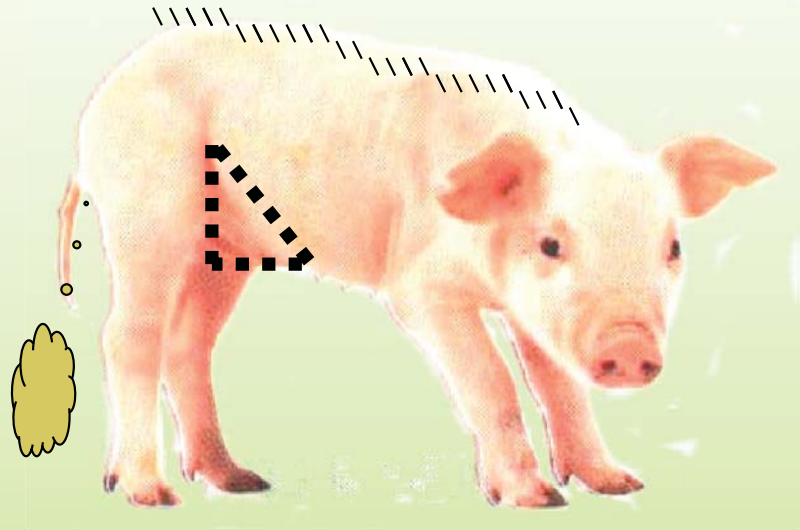
Hypoxia and its consequences

- Hypoxia

  > thermogenesis

  > delayed/less intake

  <u>colostrum</u>



- Less fat ingested by pig
- Less IgG in blood-stream pig

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Low energy reserve at birth



		piglet	lamb	baby
Glycogen	Liver (g/kg LG)	2,5	1,5	3,8
	Muscle (g/kg LG)	12,2	9,6	6
	Available energy (kcal/kg LG)	60	46	40
Fat	Total reserve (g/kg LG)	11	25	150
	Available energy (kcal/kg LG)	42	112	1301
Total energy reserve at birth (kcal/kg LG)		102	157	1341

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Comparison human-pig nutrition

A lot of colostrum/mothermilk first choice for nutrition/immunity

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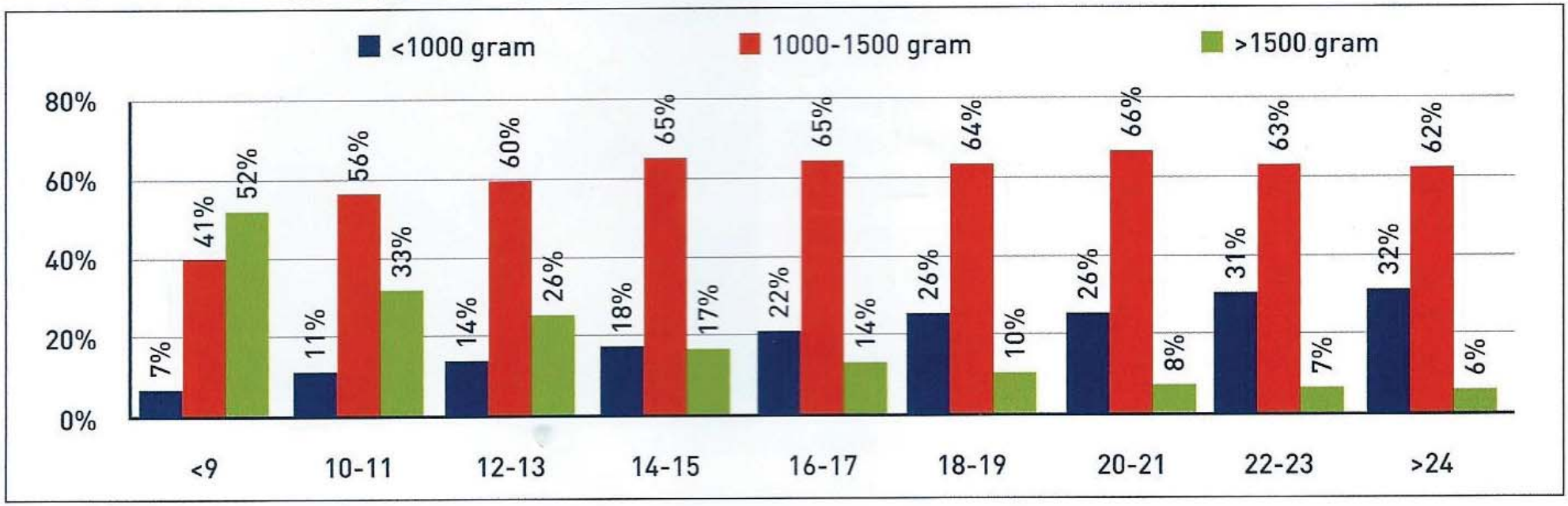
Litter size big, bigger, too big?

Kleiner aantal zware biggen bij grote tomen



Figuur 1: Een grotere toom biggen, leidt tot minder zware en meer lichte biggen. Dat blijkt uit deze grafiek die op de X-as per worpgrootte de 3 gewichtscategorieën toont (<1.000 gram, 1.000-1.500 gram en >1.500 gram) in percentage van het totaal.

ForFarmers, 2015

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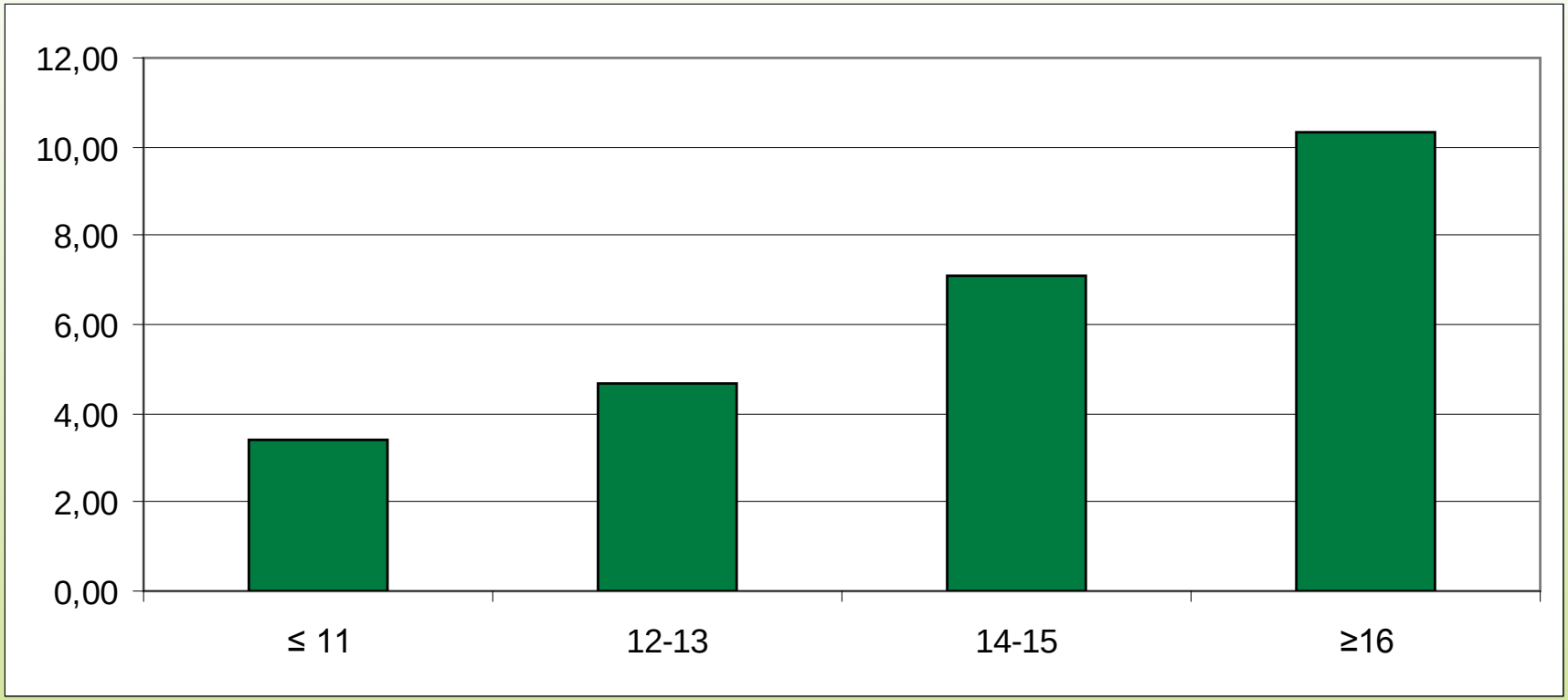
Larger litters → higher mortality

Mortality (%)



Litter size

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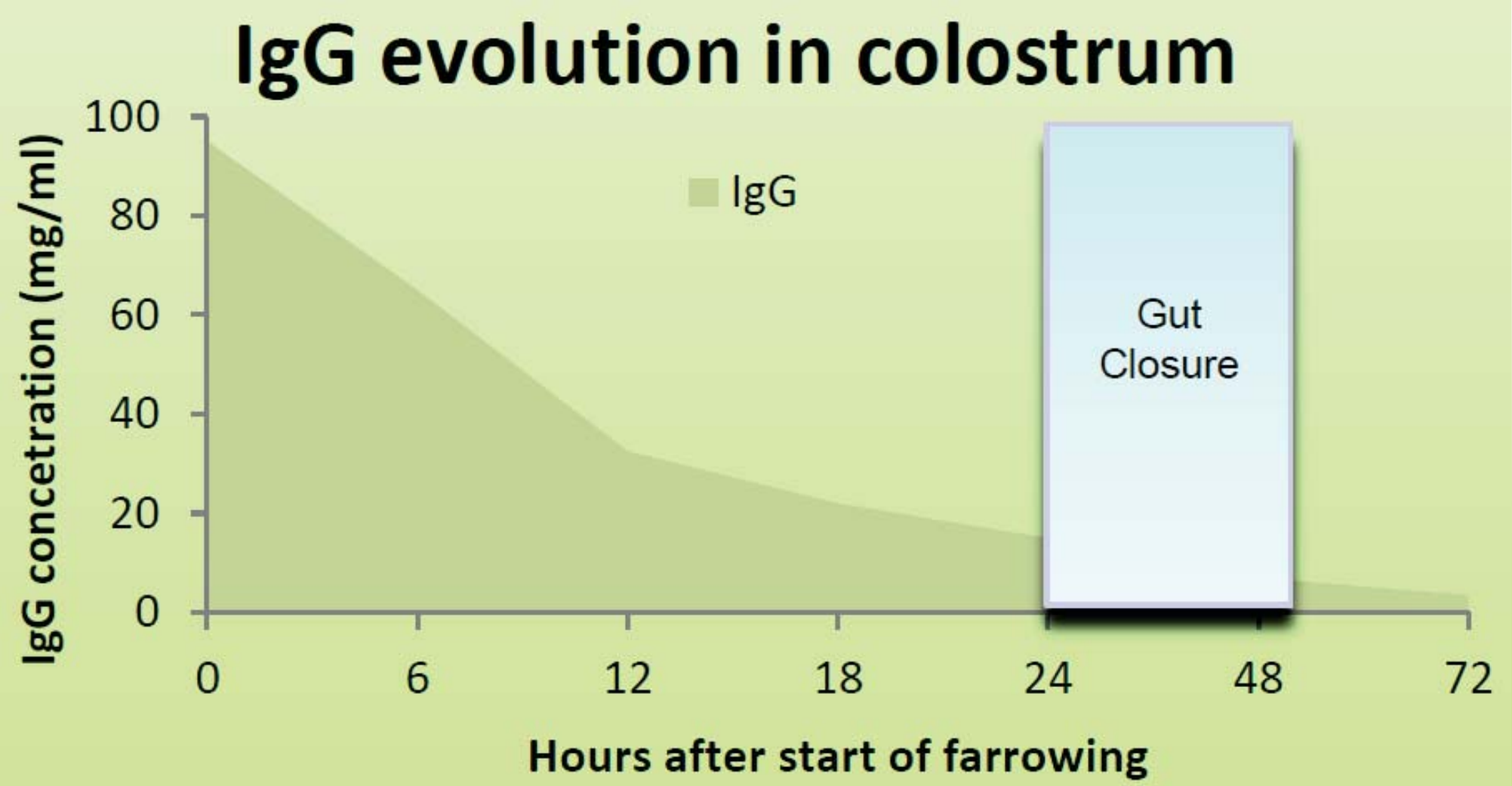
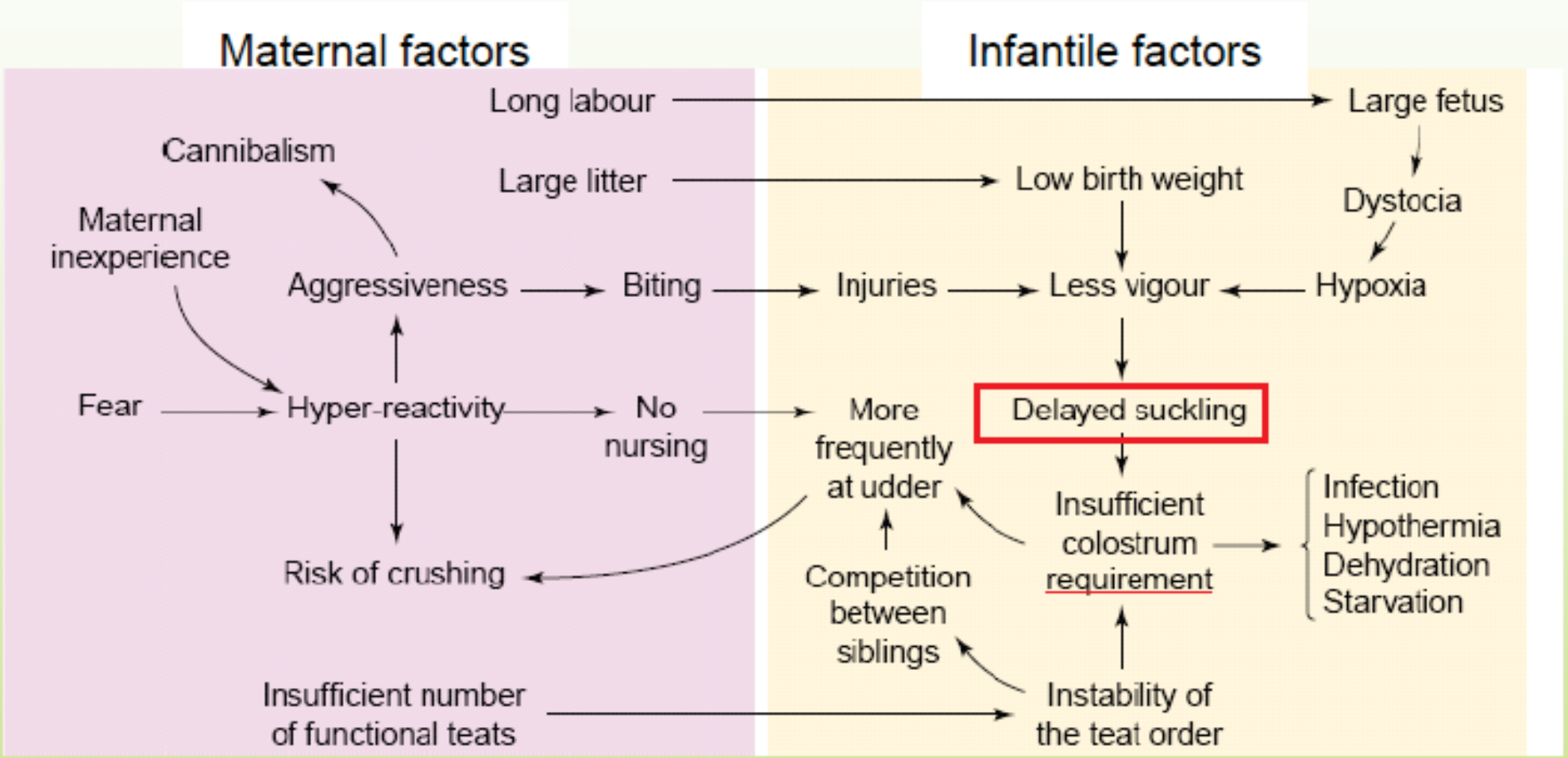
Larger litters: more variation in colostrum intake per piglet

Variation in IgG



Mother-child interaction



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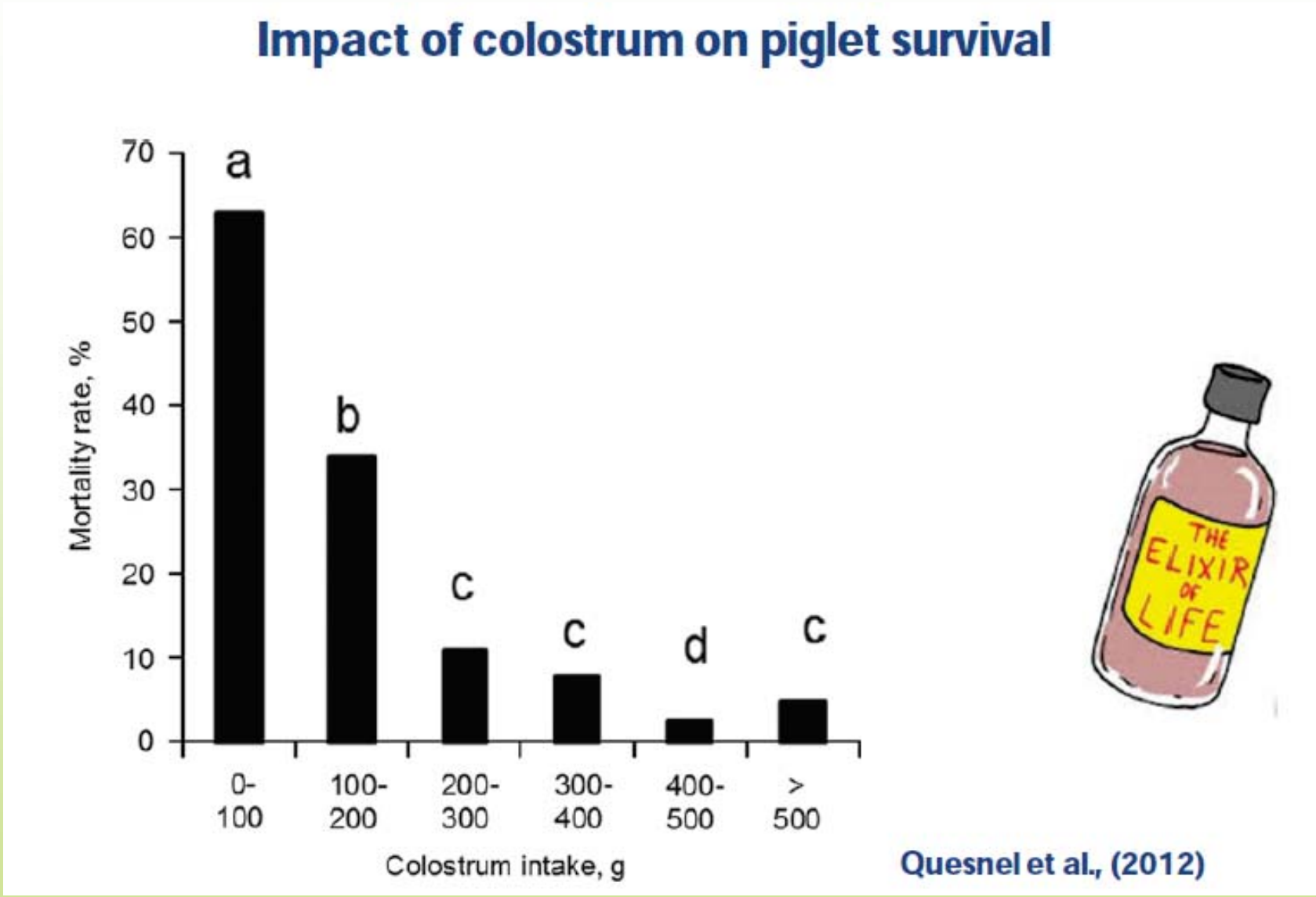
Colostrum intake piglets (1)



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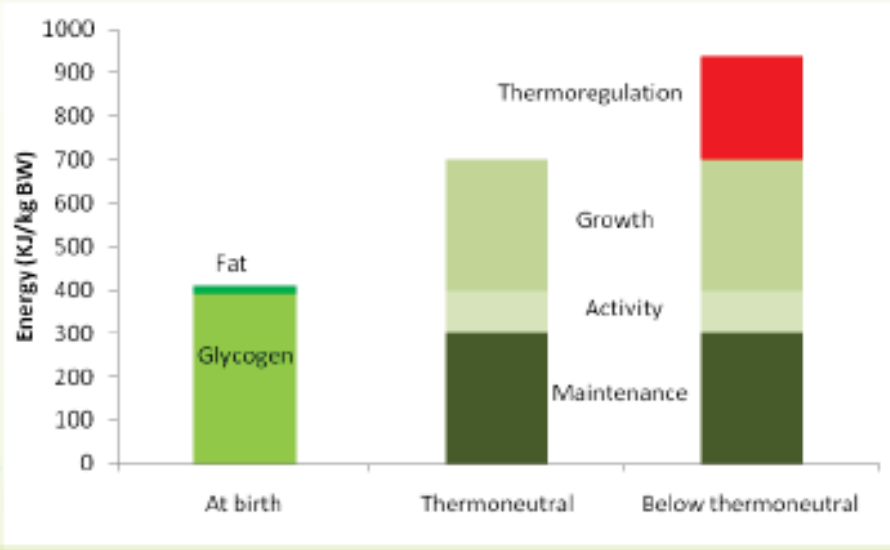
Colostrum intake piglets (2)

- Sufficient and early colostrum intake is decisive for:
  - Piglet survival
  - Piglet development

- Colostrum provides:
  - Energy
    - Thermoregulation
    - Homeostasis during the first 24 hours
    - Growth and movement
  - Protection against infections until full activation of the immune system
  - Colostrum is the only source of IgG in neonatal piglets

Energy reserve and requirements until 24 h after birth
(Le Dividich et al., 2005)



Colostrum effective against infections

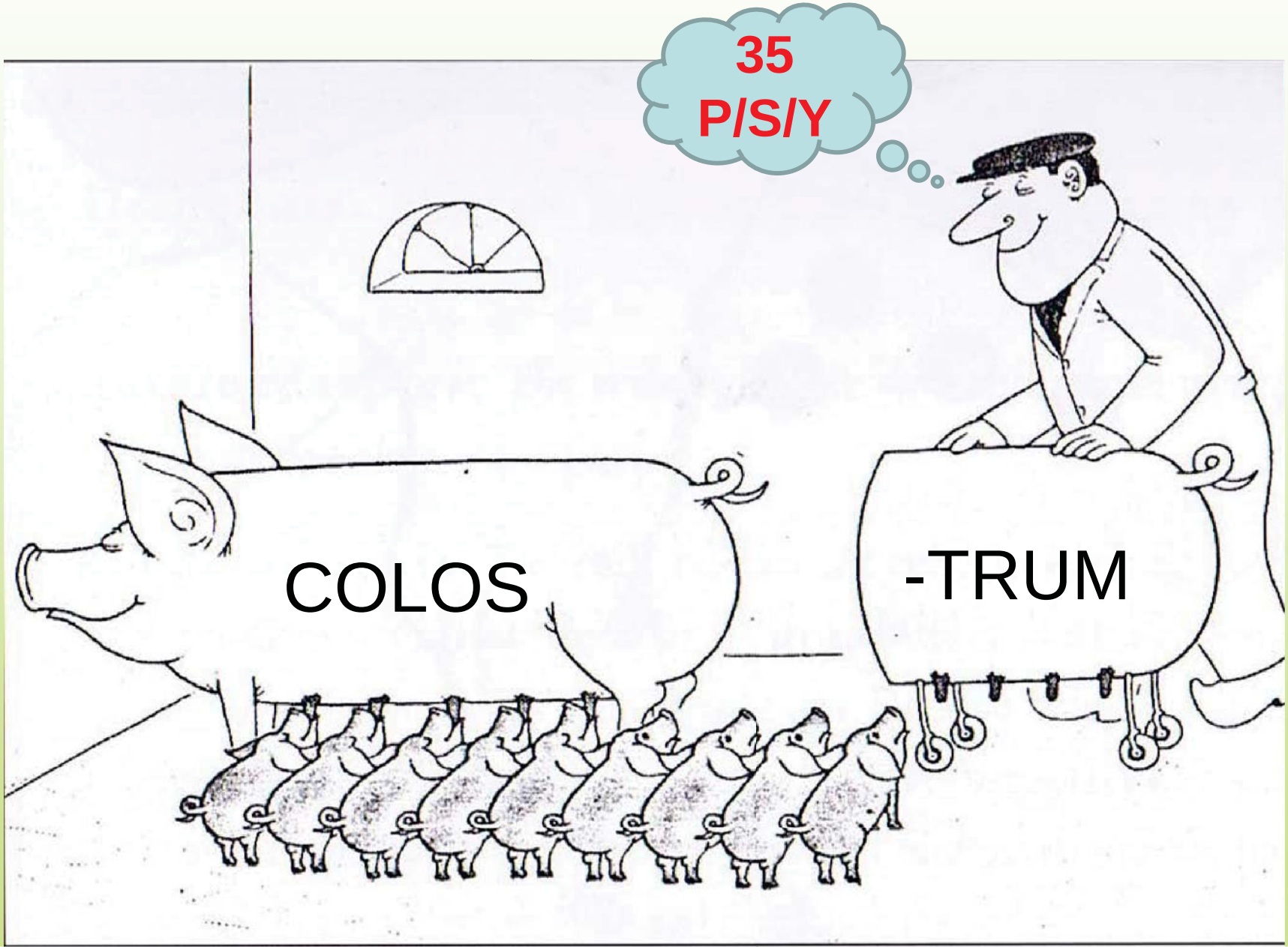
- Colostral factors assist in gut closure
- Not ingesting colostrum results in ineffective closure of gut and entrance of pathogens into the bloodstream (like E.coli)

→ close to 100 % mortality < 7 days

Other anti-infective factors of colostrum

- Lots of neutrophils — Ingest bacteria in gut
- Whey and fat: oligosaccharides and glycoproteins — Bind with enterotoxigenic bacteria
- Unsaturated fatty acids and monoglycerides — Can kill enveloped viruses
- Hydrolytic products of milk fat — Kill single-cell parasites

Is there enough colostrum for all ?



One bag for all, also with larger litters!!

Colostrum Volume per sow	Litter size 10	12	14	16	18
2000	200	167	143	125	111
3000	300	250	214	188	167
4000	400	333	286	250	222
5000	500	417	357	313	278
6000	600	500	429	375	333

Devillers 2004 and 2007:
- Minimum need = 170 g/kg BW, avg. consumption = 290 g/kg BW,
- Colostrum yield = 1.91- 5.31 kg, independent of litter size

Colostrum **distribution** becomes critical especially in hyper prolific breeds

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AHA??

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Larger litters, more delphin-heads

Hales/Amdi, 2014

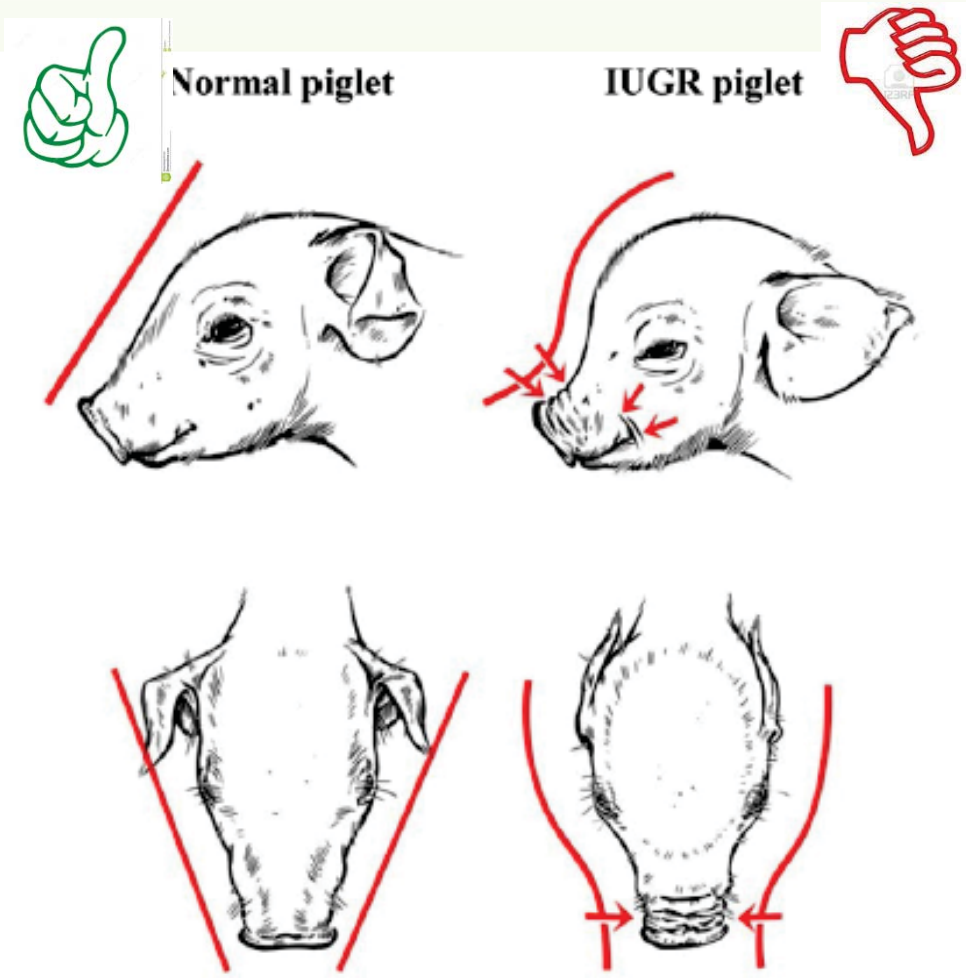
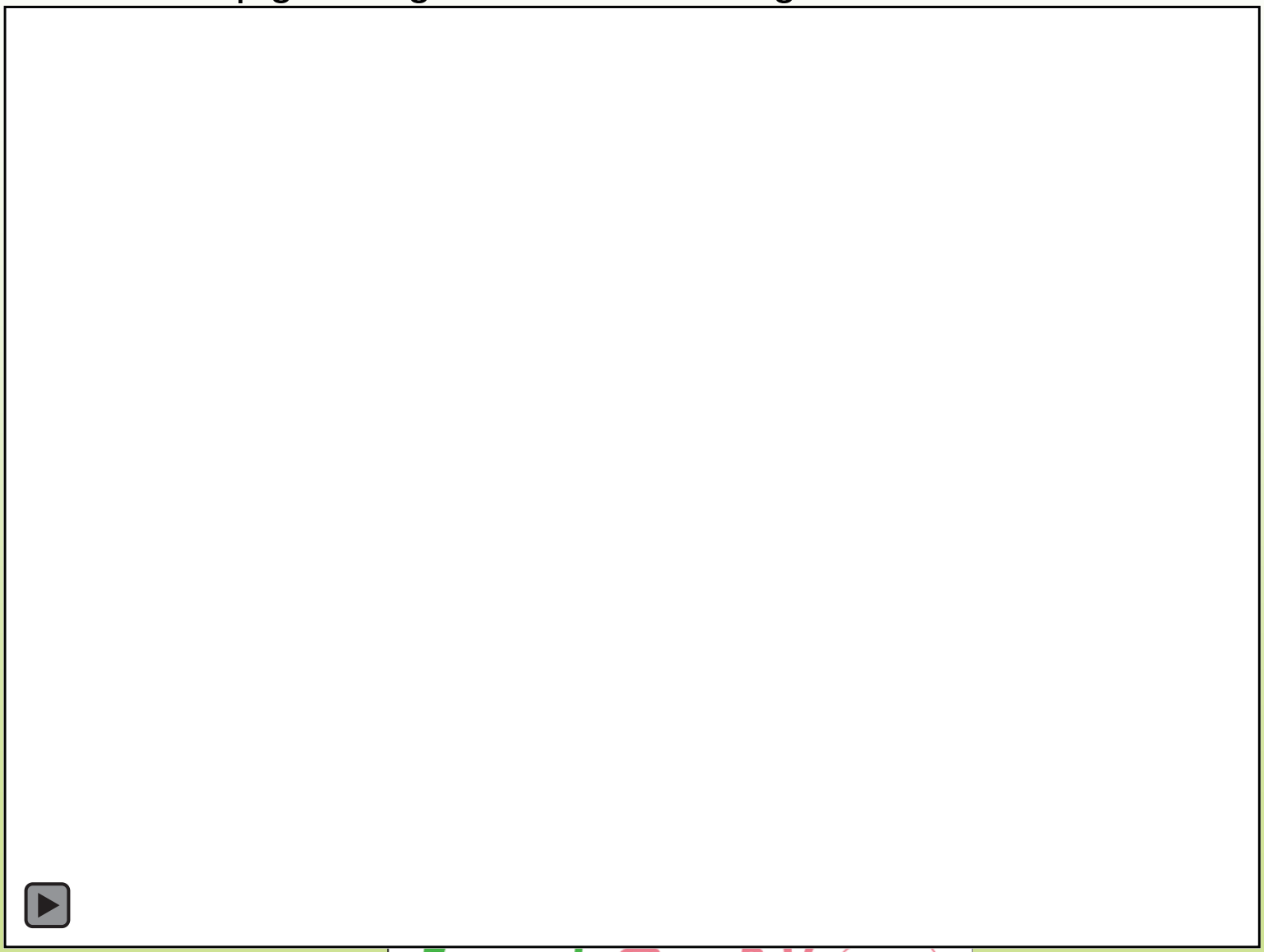


Figure 2. Illustrations of a normal (left) and a growth-restricted piglet (right). Criteria for growth restriction were 1) steep, dolphin-like forehead, 2) bulging eyes, and 3) wrinkles perpendicular to the mouth. IUGR = intrauterine growth restriction. See online version for figure in color.

	IUGR score			
	Normal	m-IUGR	s-IUGR	*P*-value
n	420	153	46	
Piglet characteristics				
Birth weight, g	1,326 ± 12[a]	961 ± 16[b]	682 ± 23[c]	<0.001
Crown rump length, cm	25.3 ± 0.1[a]	23.3 ± 0.2[b]	21.1 ± 0.3[c]	<0.001
Body mass index, kg m^{-2}	20.6 ± 0.2[a]	17.7 ± 0.3[b]	15.3 ± 0.5[c]	<0.001
Ponderal index, kg m^{-3}	82.2 ± 0.8[a]	76.5 ± 1.3[b]	73.0 ± 2.5[b]	<0.001
Vitality scores	1.5 ± 0.1[a]	1.4 ± 0.1[ab]	1.2 ± 0.2[b]	0.069
Weight at 12 h, g	1,422 ± 14[a]	996 ± 19[b]	681 ± 27[c]	<0.001
Weight at 24 h, g	1,431 ± 14[a]	999 ± 20[b]	677 ± 26[c]	<0.001
BW change 0 to 24 h, %	7.4 ± 0.3[a]	2.6 ± 0.6[b]	–2.0 ± 1.0[c]	<0.001
Colostrum intake g				
0 to 12 h, g	193 ± 4[a]	106 ± 7[b]	58 ± 13[c]	<0.001
12 to 24 h, g	73 ± 3[a]	59 ± 6[b]	45 ± 11[b]	0.002
0 to 24 h, g	268 ± 5[a]	163 ± 9[b]	97 ± 16[c]	<0.001

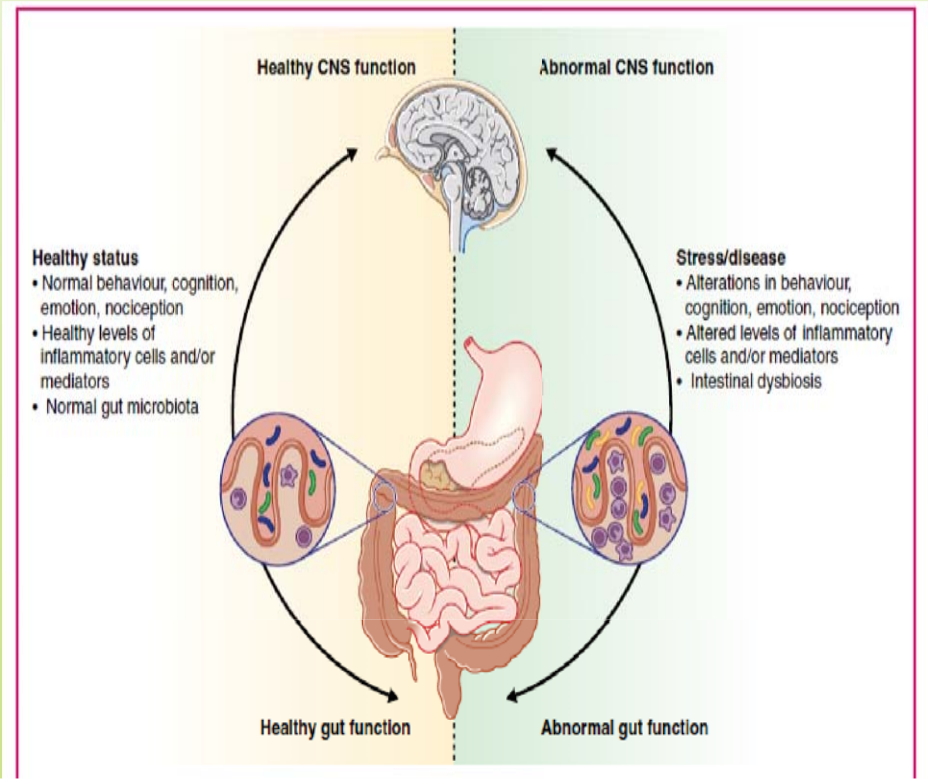
Manual assistance?

20 % of piglets ingest less than 250 grammes of colostrum



Colostrum – the magic potion !!

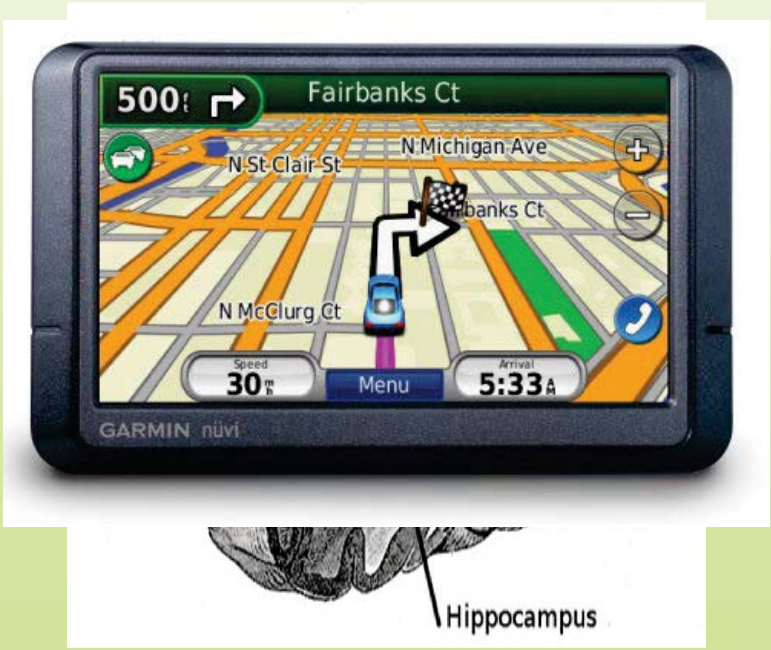
- Colostrum stimulates *<u>healthy</u>* intestinal flora and intestinal wall development → positive effect on CNS/brain



Colostrum – never too much !!

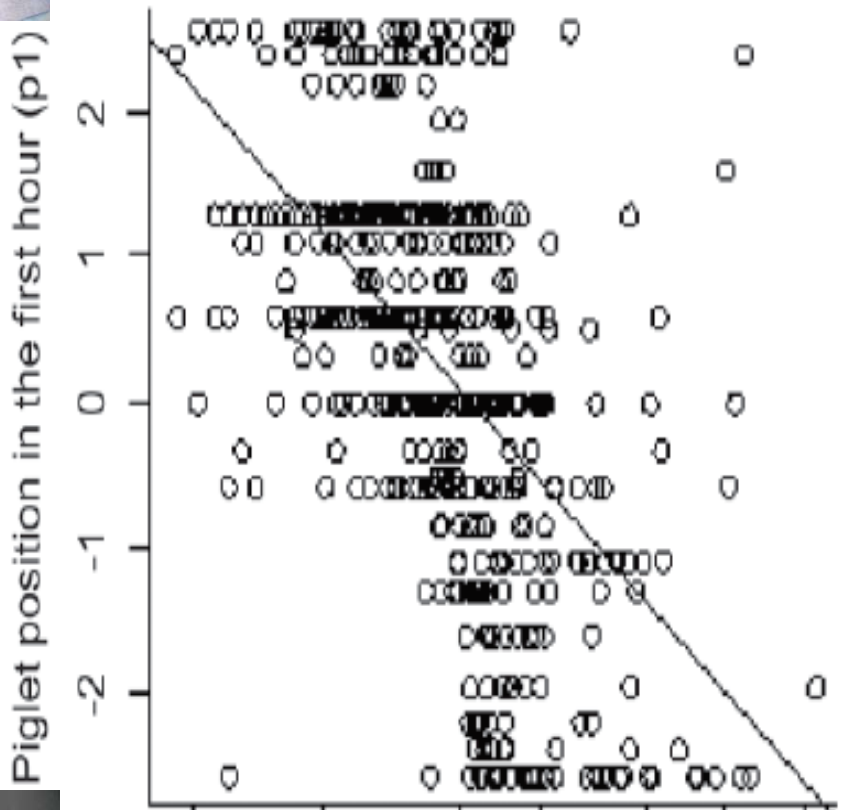
- Colostrum stimulates the brain development
  → especially hippocampus

Hippocampus:
- Emotional behaviour
- Memories !
- Spatial learning !!!



Pierzynowski et al, 2014; Wolinsky et al. 20

Disturbed GPS



Preventative measures

- Maximise colostrum production
- Increasing vitality by breeding
- Optimise environment by professional observation of animals and their behaviour
- Split suckling
- Preventing MMA/preventing pain responses

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Maximise colostrum production

1. Dietary fibre

		weight gain (g/piglet)	
33% suger beet pulp	Mating- > d 108	135	
21% pectin residue	Mating-> d 108	131	
46% potato pulp	Mating-> d 108	71	
Standard gest diet (17%)	Mating-> d 108	96	

Normal range for piglet weight gain during colostrum period in 10 trials: 95 ± 5 g/piglet (Normal range 80 – 110)

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Theil, 2016

Maximise colostrum production

2. Dietary fat

		weight gain (g/piglet)	
8% Sunflower oil	d 108 -> parturition	138	
8% Coconut oil	d 108 -> parturition	121	
4+4% Octanoat/fish oil	d 108 -> parturition	117	
8% Fish oil	d 108 -> parturition	81	
Standard lact diet (- add)	d 108 -> parturition	83	

Normal range for piglet weight gain during colostrum period in 10 trials: 95 ± 5 g/piglet (Normal range 80 – 110)

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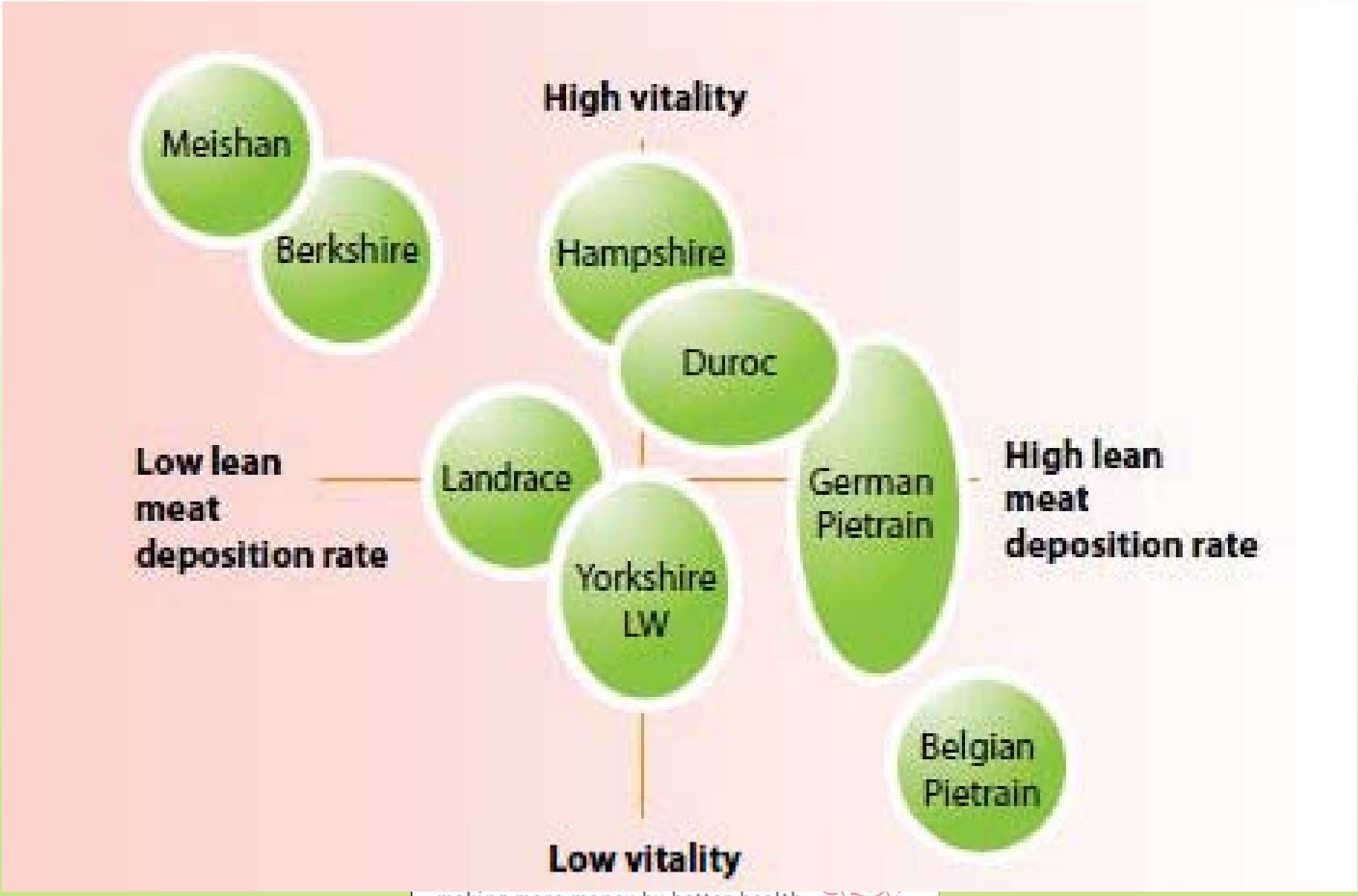
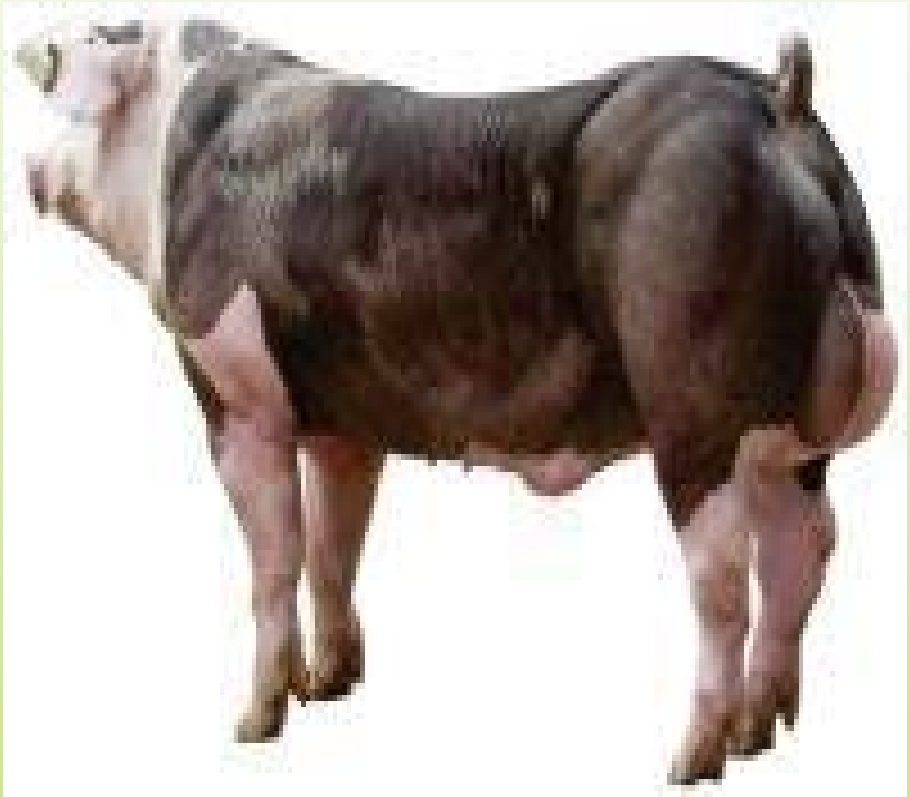
Increasing vitality



Increasing vitality



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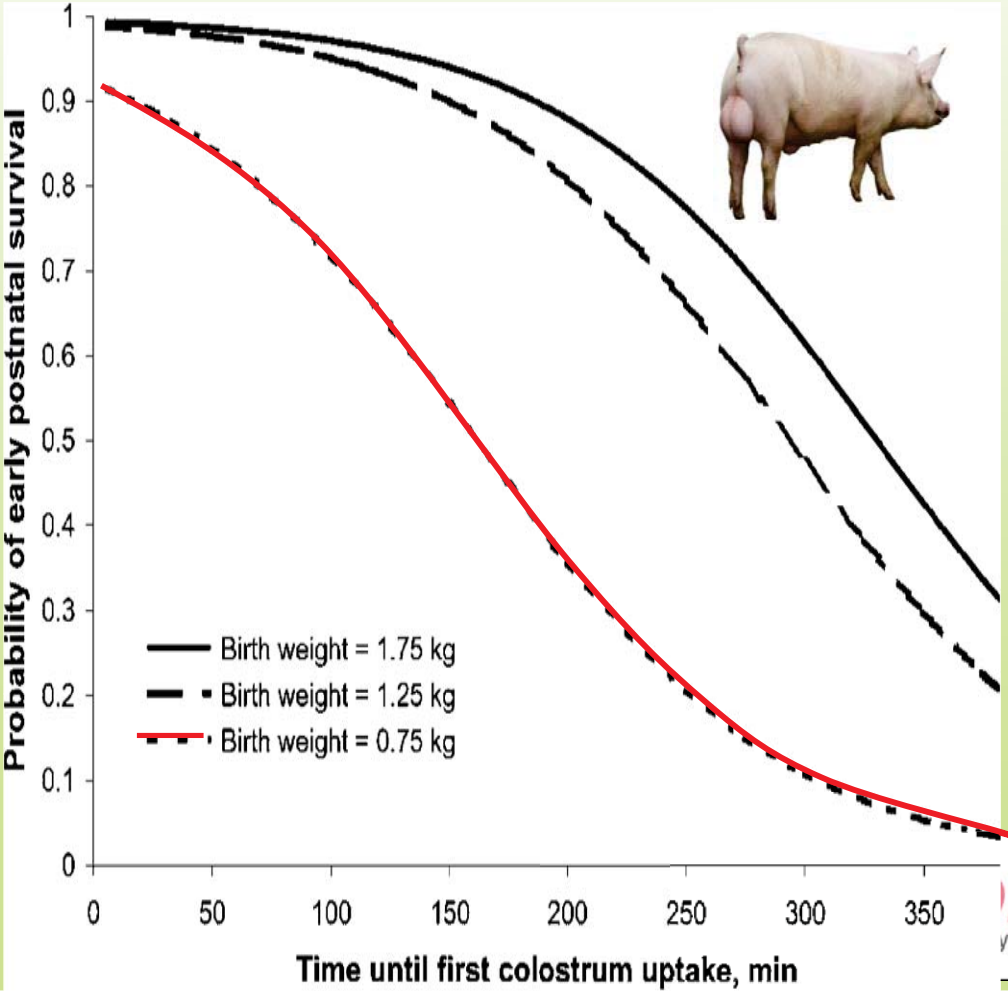
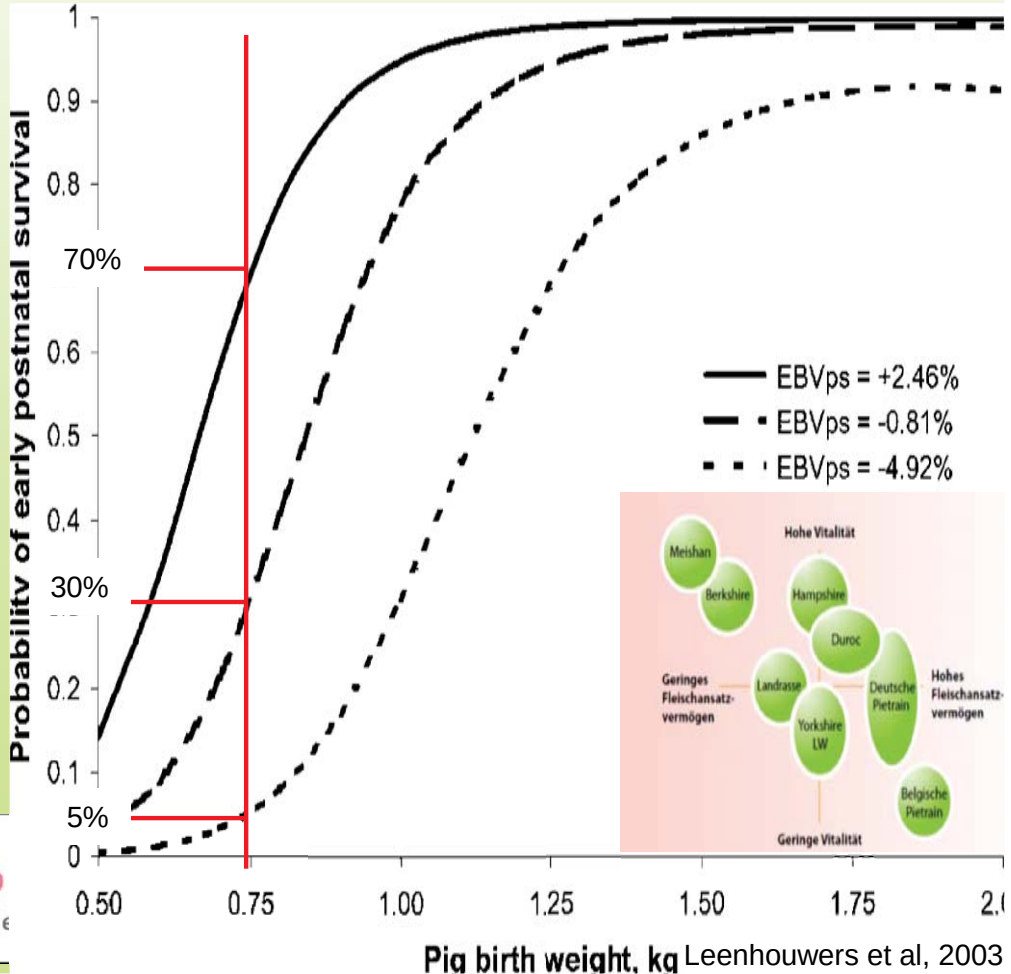
The Prince!

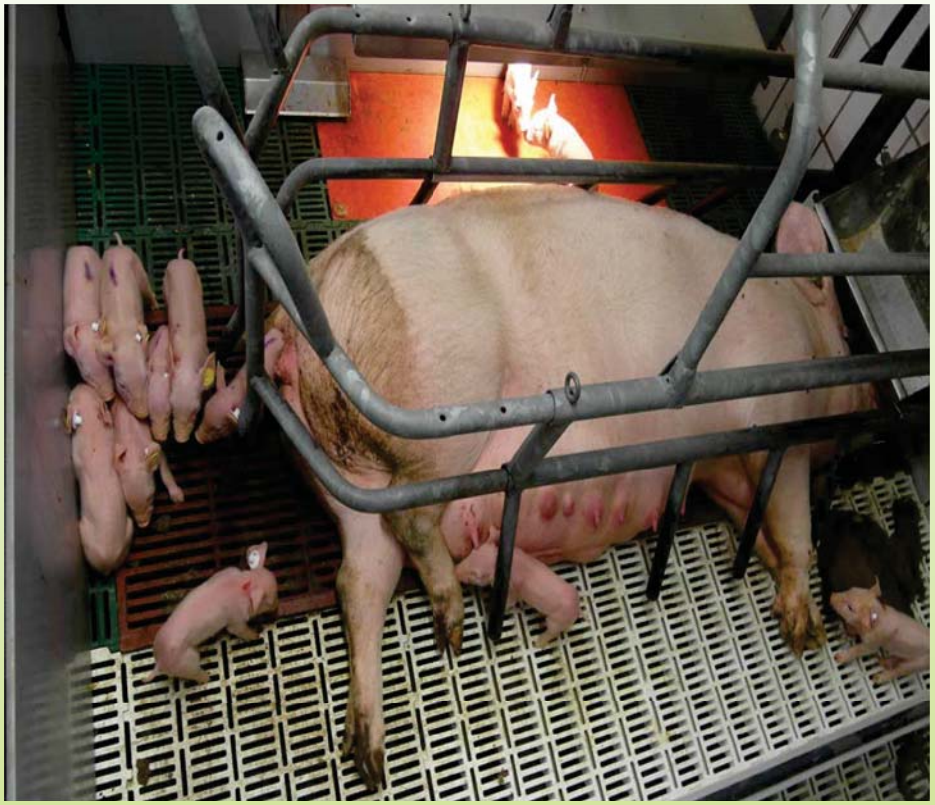
- Increasing vitality → giga genetic effects





Leenhouwers et al, 2003

Optimising the environment



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.... Heat stress?

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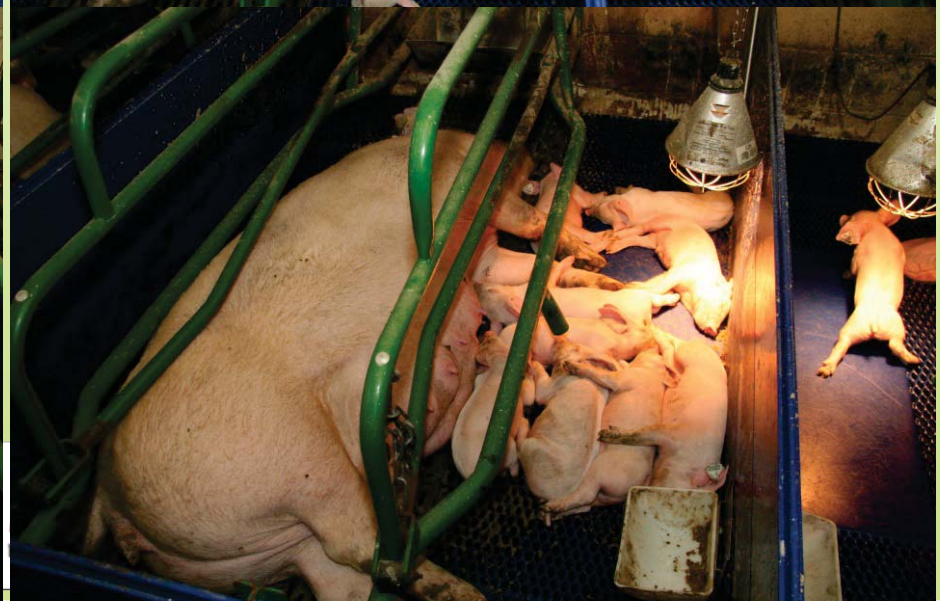
What happened?

AHA?! AHA!

- Environmental temperature



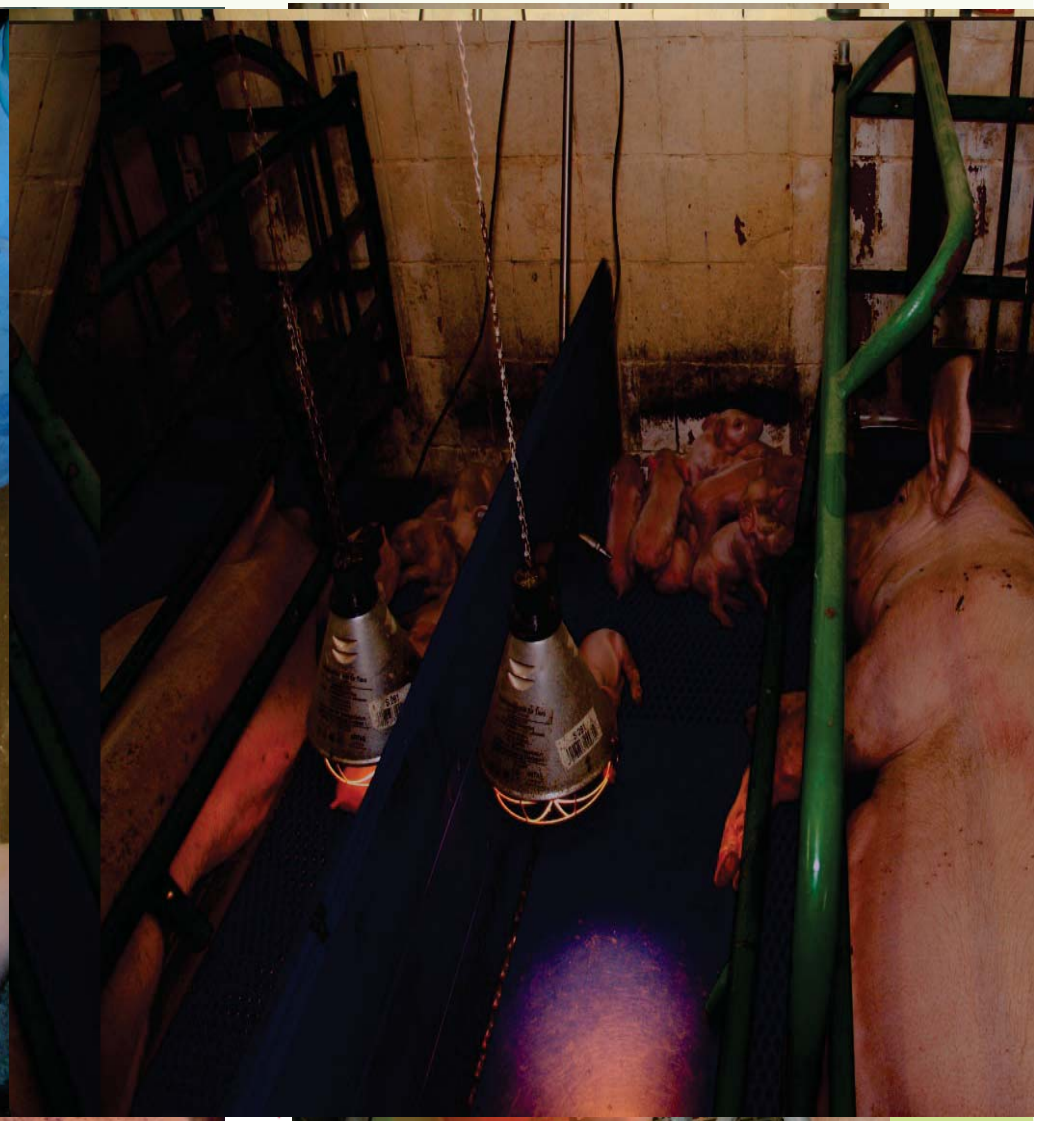



Lying behaviour

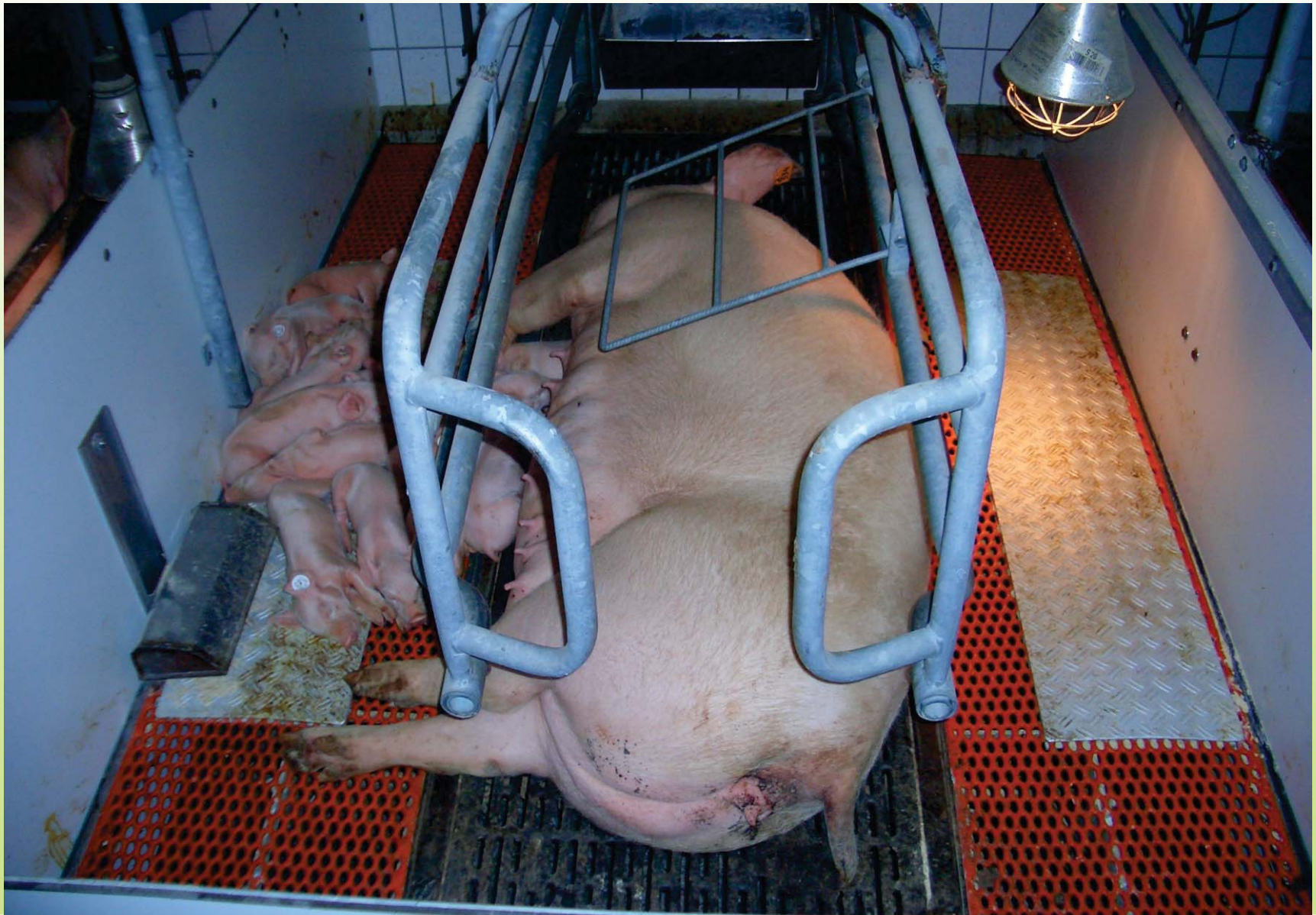
… lying behaviour

… scoring lying behaviour

… and scoring lying behaviour



AHA? AHA!



Split suckling

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Influencing colostrum production

Colostrum production influenced by		NSAID brand A,	NSAID brand B	NSAID brand C broad spec
Early confinement lactating sow	↑			
Good body condition	↑			
High water-intake (+2,5 ltr/min)	↑			
Inflammatory processes (mastitis)	↓			X
Low water-intake	↓			
Endotoxins , slow intestinal motility	↓			X
Fever	↓	X		X
Pain (f.e. manual intervention)	↓	X		X

Plenty of colostrum- summary

MS-Colostrum Basket

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All living creatures have the same divine beginning; all are in unity.
We are all members of one great body!

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