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Second Litter Syndrome: Threat or Challenge?

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APPROCCIO PRATICO ALL'IPOFERTILITA DELLA SCROFA: CAUSE E SOLUZIONI

Agenda:

- Characteristics of the Second Litter Syndrome (SLS)
- Impact of the SLS
- Causes of the SLS
- Management strategies support SLS-prevention
- Reproduction Control: the strategy to prevent SLS
- Conclusion

Characteristics of the Second Litter Syndrome (SLS)

- A prolonged Weaning-Oestrus- or Weaning-Service-Interval after the first parity
- A decreased Gestation Rate after the first parity
- A decreased Farrowing Rate in the second parity
- A reduced or similar Litter Size in the second parity
- An outstanding high Replacement Rate
- SLS is a problem of the individual farm

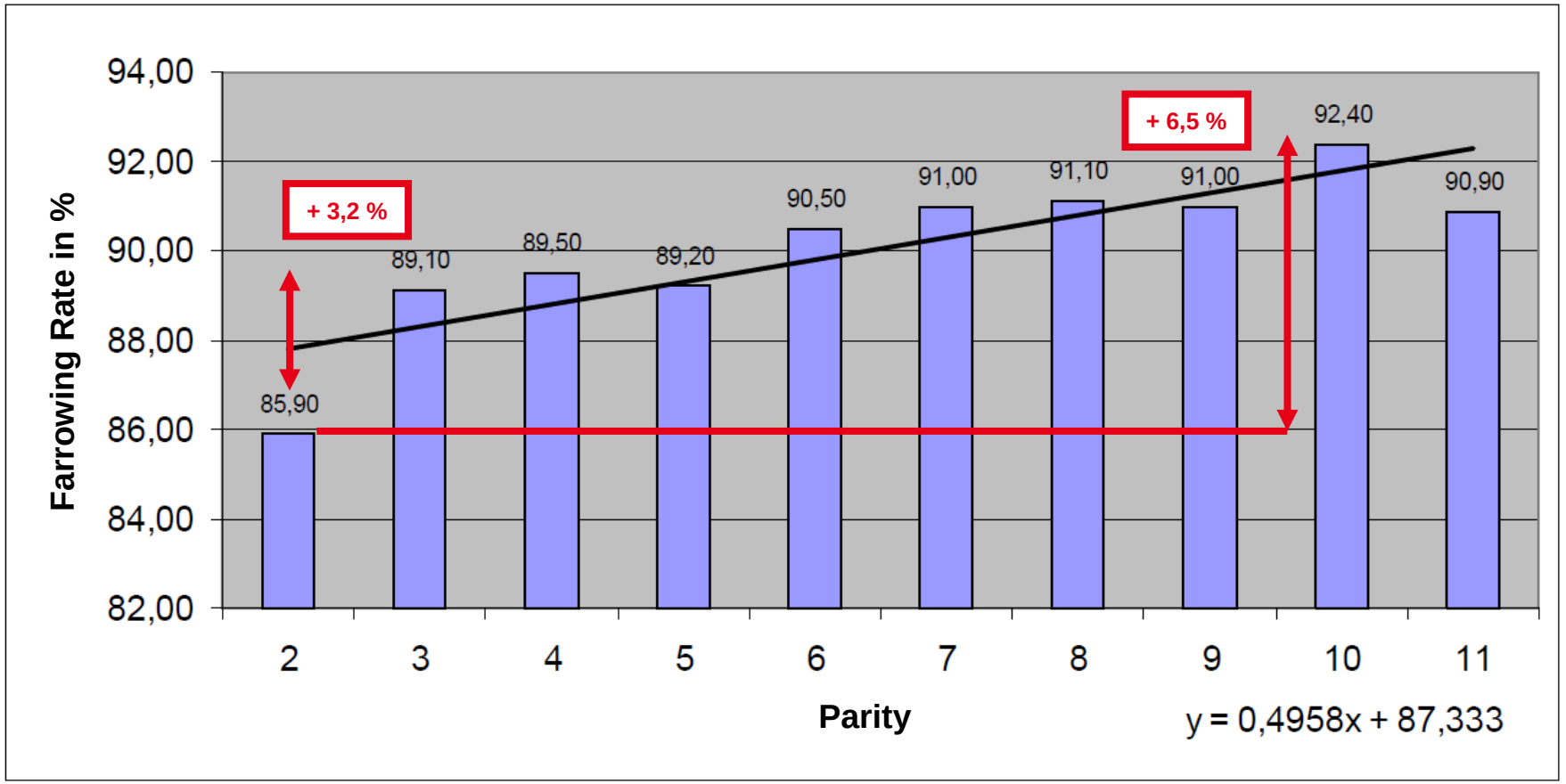
SLS and Weaning-Oestrus-Interval (WOI)

Factor	Factor Level	n	Average WOI (d)	Significance
Lactation period (weeks)	3	14.213	5,36	No significance
	4	7.063	5,32	
Parity	2	3.823	5,61	*** P < 0,001
	3-6	12.795	5,28	
	≥ 7	4.661	5,13	

Results of a Analysis of Variance (ANOVA)

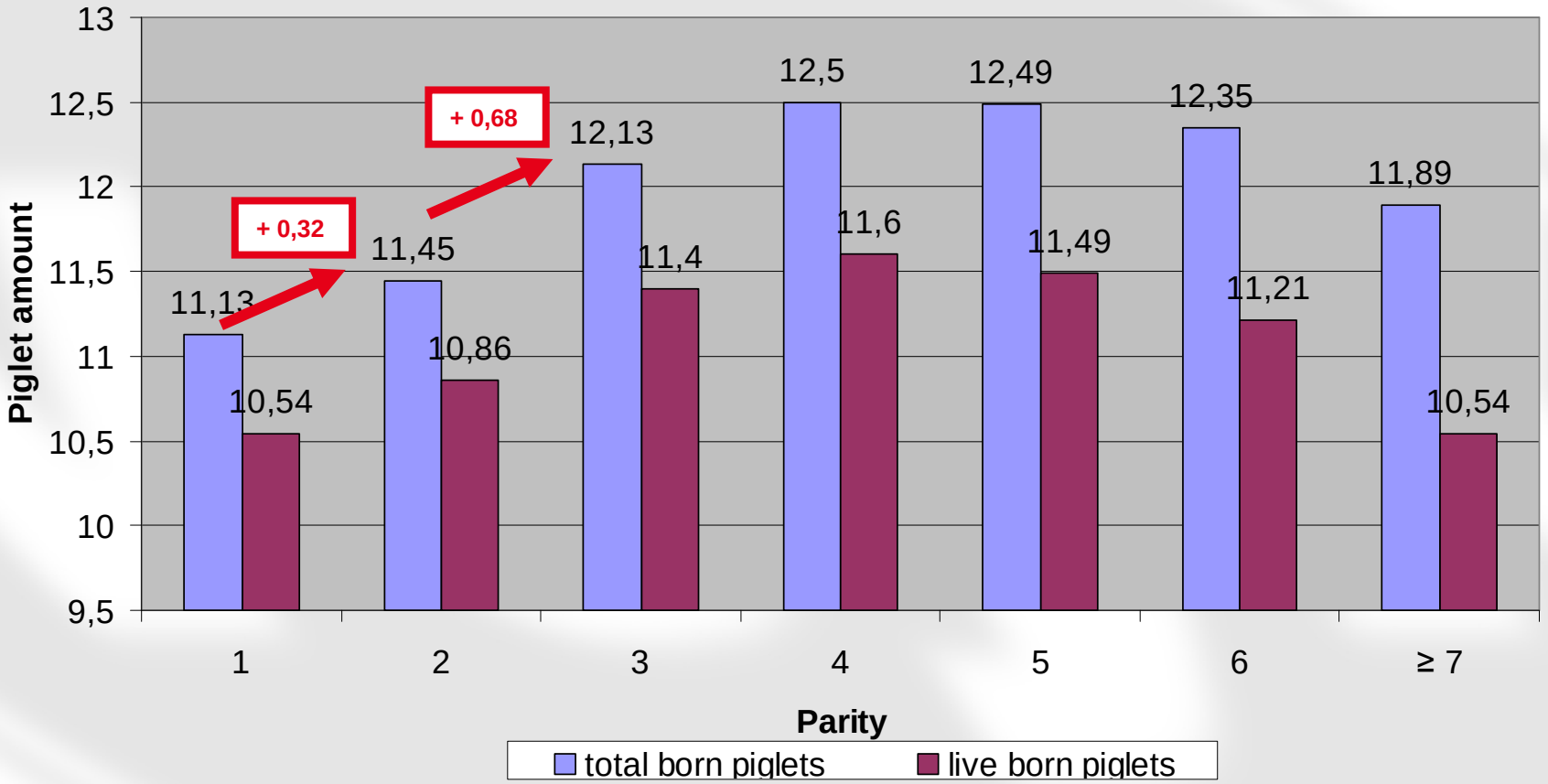
Source: Viebahn, 2009

SLS and Farrowing Rate (in well managed farms)



Source: Viebahn, 2009

SLS and Litter Size I



Source: Viebahn, 2009

SLS and Litter Size II

Factor	Factor Level	n	Average total born piglet	Significance
Lactation period (weeks)	3	12.364	11,74	*** P < 0,001
	4	5.712	12,07	
Parity	2	3.300	11,36	*** P < 0,001
	3-6	11.479	12,42	
	≥ 7	3.297	11,93	

+ 1,06

Results of a Analysis of Variance (ANOVA)

Source: Viebahn, 2009

SLS and Replacement Rate

„In Denmark ≥ 20% of the gilts do not reach the 3. parity…“

Source: Dr. Peter Johannsen, DTL A/S, Lecture Leipzig, 25.01.2011

Consequence:
Increase of the Replacement Rate

Target Replacement Rate in %	Forecast Replacement Rate in %
35	44
40	50
45	56

Impact of the SLS

The model farm:

Parameter	Shape
Average number of sows	1000
Share of primiparous in %	20
Average lactation length	24
Average farrowing/sow/year	2,4
Average replacement rate in %	53
Average farrowing rate in %	89
Average farrowing rate of primiparous in %	76
Average number of sold piglets/sow/year	25

Impact of the SLS

Impact on productivity ……

Performance of FR* in second litter sows	Modification of total FR	Modification of sold piglets
+ 5 %	+ 1 %	+ 250
+ 10 %	+ 2 %	+ 500

* : FR = Farrowing Rate

= + 1 farrowing primiparous per batch
= 0,5 sold piglets/sow/year

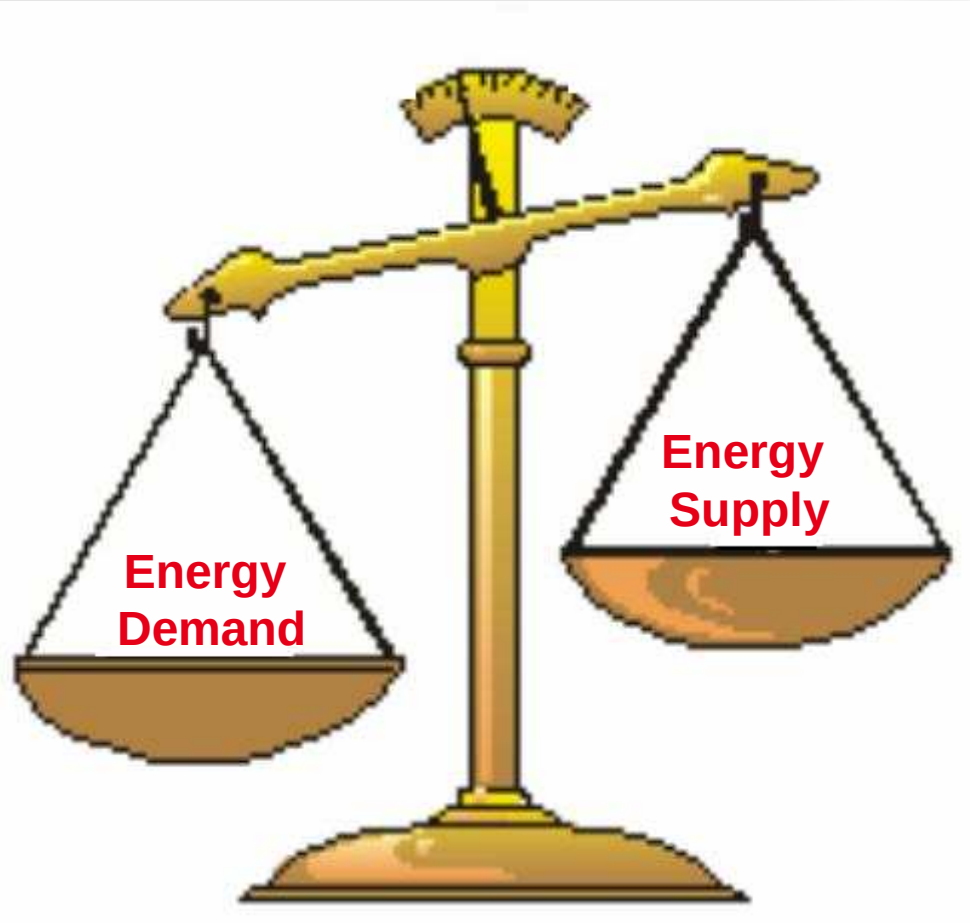
Impact of the SLS

….. impact on cost performance

Performance of FR in second litter sows	Modification of demand on replacement gilts	Modification of costs*
+ 5 %	- 3 gilts/year	- 2.790,- €
+ 10 %	- 30 gilts/year	-27. 900,- €

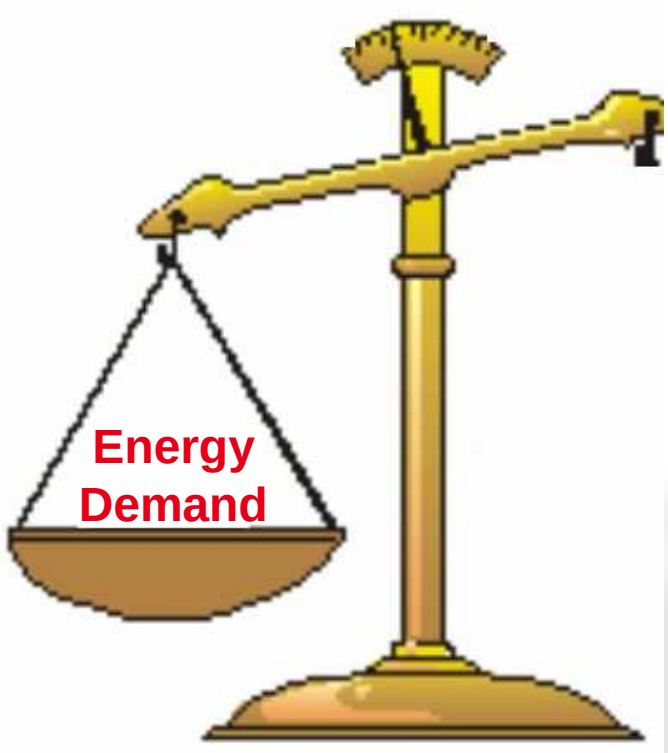
* = considered costs: purchase, feed + housing for introduction period, additional work load.
Not considered: costs of vaccinations, oestrus synchronisation, lack of productivity, additional vet services

Causes of the SLS



A negative energy balance during the first lactation period

Causes of the SLS

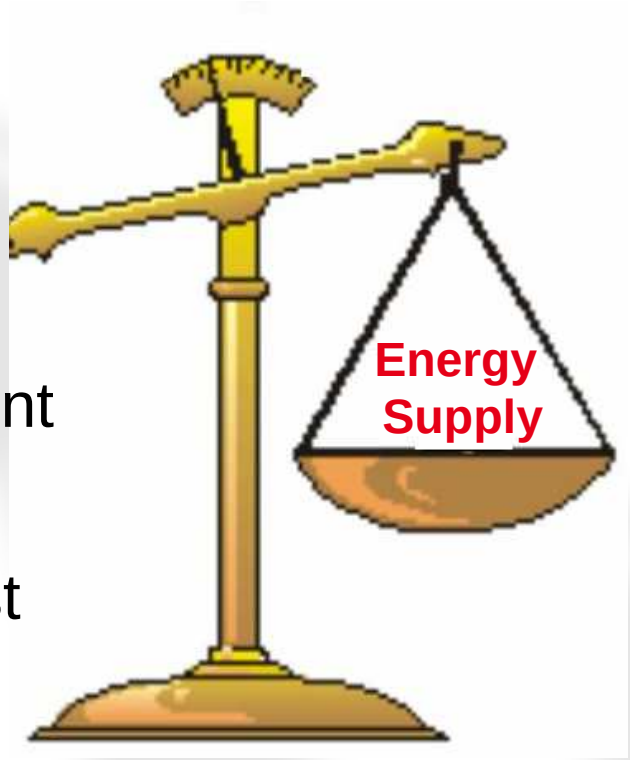


Trigger of high energy demand:

- high fertility in the first litter,
- high milk production,
- long lactation period,
- not finalized growing and maturing process,
- unsufficient housing conditions (temperature, ammonia concentration, animal health status)

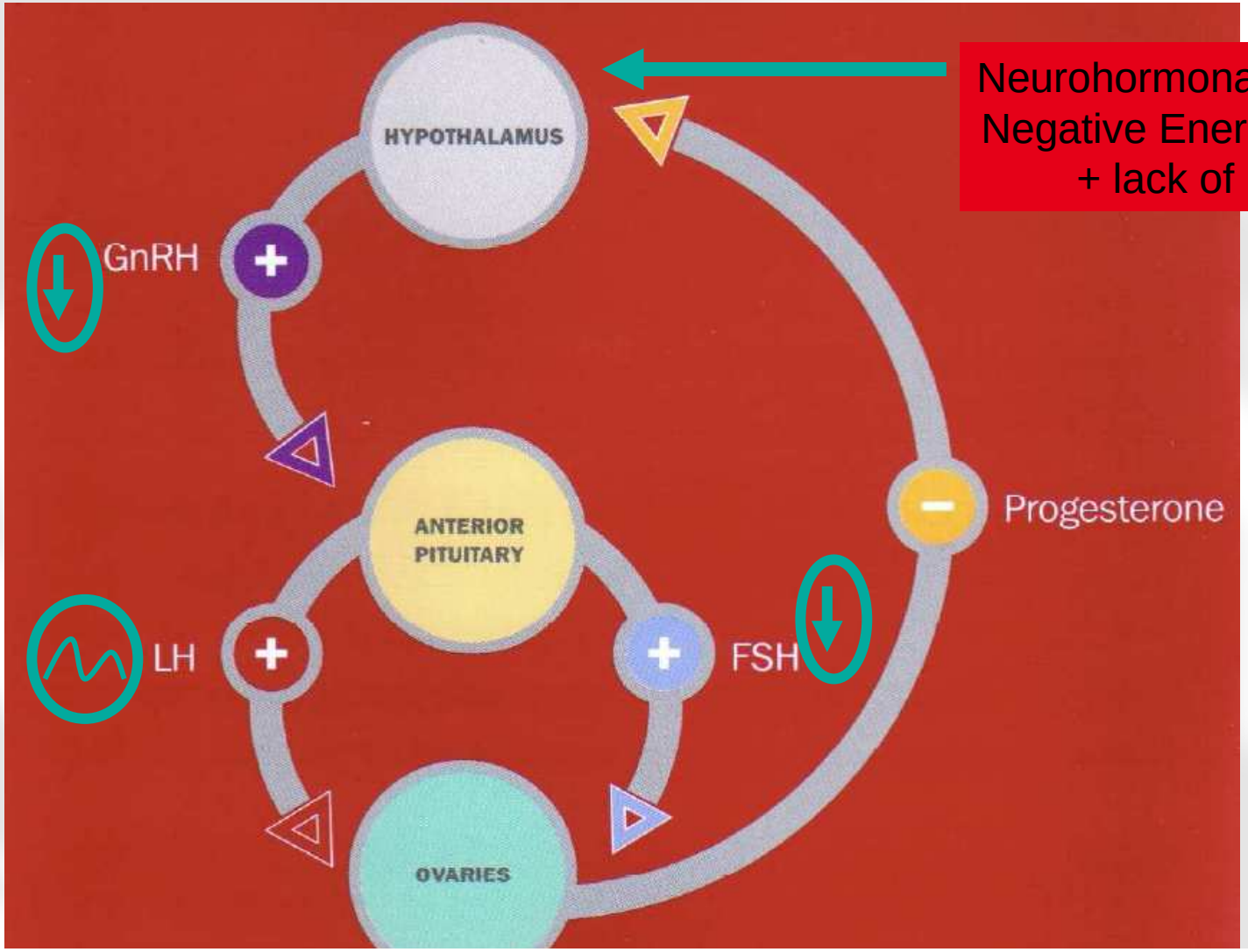
Causes of the SLS

Trigger of low energy supply:



- lack of body condition and depot fat
- unsufficient gilt introduction management
- not adapted feeding strategy during rearing-, introduction-, gestation- and first lactation- period,
- low animal health status,
- leg lesions,
- unsufficient housing conditions (floor design, light management,boar/puberty management),
- unsufficient socialization (sow-sow, sow-human being, group housing)

Causes of the SLS



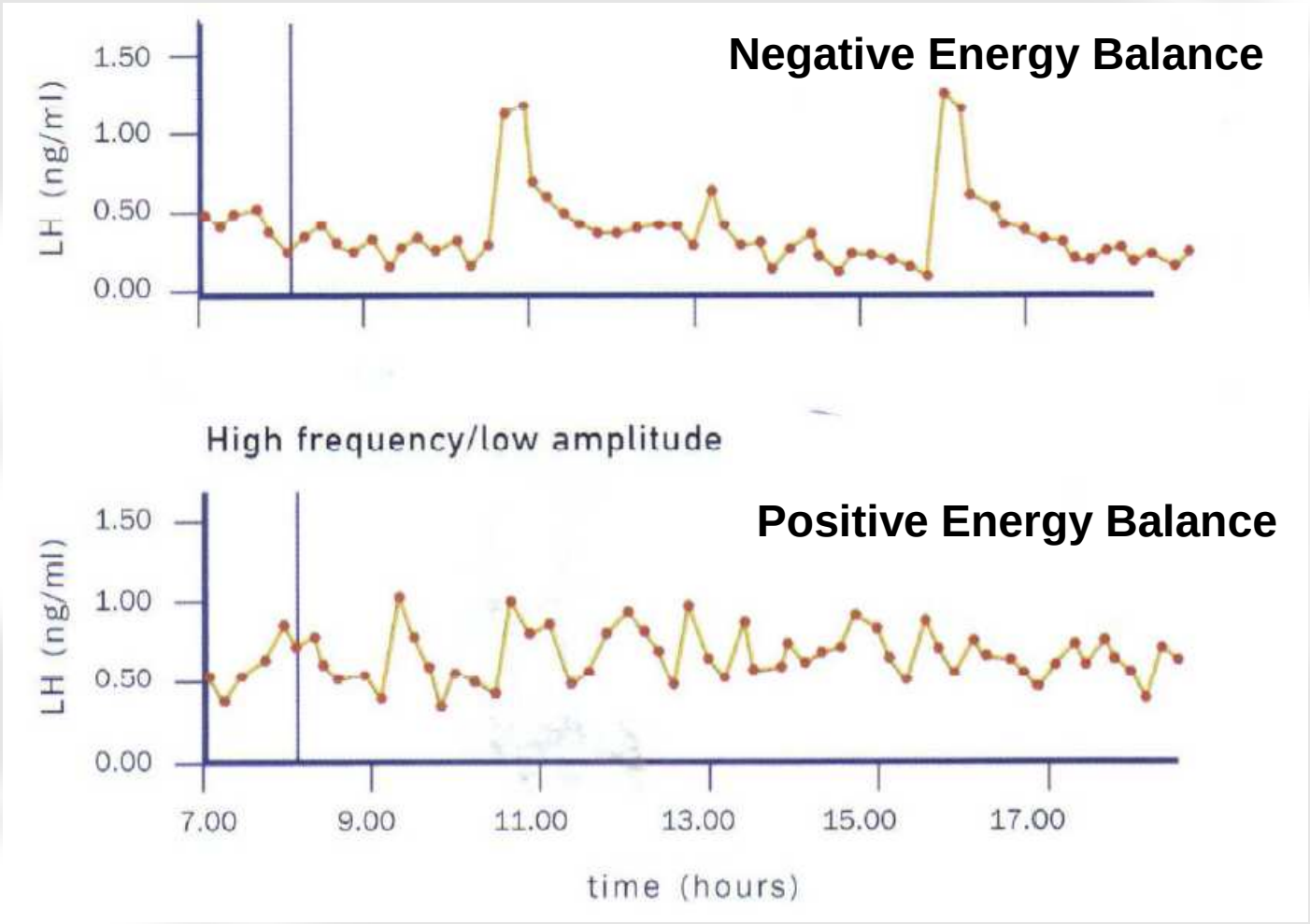
Neurohormonal Message:
Negative Energy Balance
+ lack of Leptin

Source: Janssen Animal Health, 2004

Reduced number + quality of follicles = unsufficient fertility performance

Causes of the SLS

Recruitment of follicles depends on high pulse frequency with low ampitude of LH



Source: Kemp et al., 2004

Management strategies support SLS-prevention

- Optimize feeding strategy from the rearing period up to weaning of the 3. litter according the „gilts“ requirements.
- A gilt is not a fattener: adjust the feeding strategy to develop fat tissue.
- A gilt is not a fattener: do not explore the genetic potential of daily weight gain.
- Control the onset of puberty = stimulating by a good boar
- Document the sexual cycles
- Choose the optimal age and body condition for 1st service
- Ensure a high animal health status
- Skip a heat: possible strategy but economical not reasonable

Reproduction Control - the strategy to prevent SLS

Material and methods:

- 11.852 pluriparous sows (2 or more farrowings)
  3.498 primiparous sows (first litter sows)
- Danish breed
- Healthy sows (no puerperal disorders, no gynaecological abnormalities, good general health condition and body condition)
- Lactation period: 21 days, weaning Thursday 10.30 a.m.

Reproduction Control - the strategy to prevent SLS

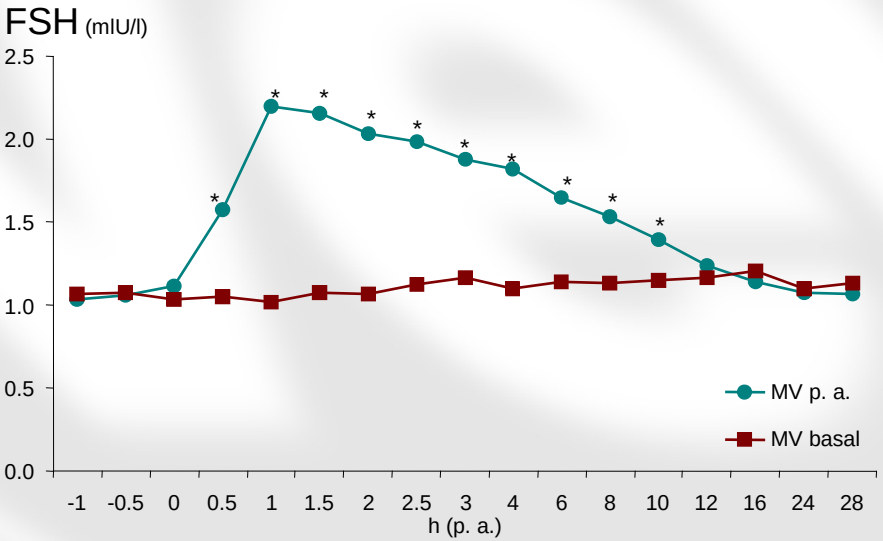
Material and methods:

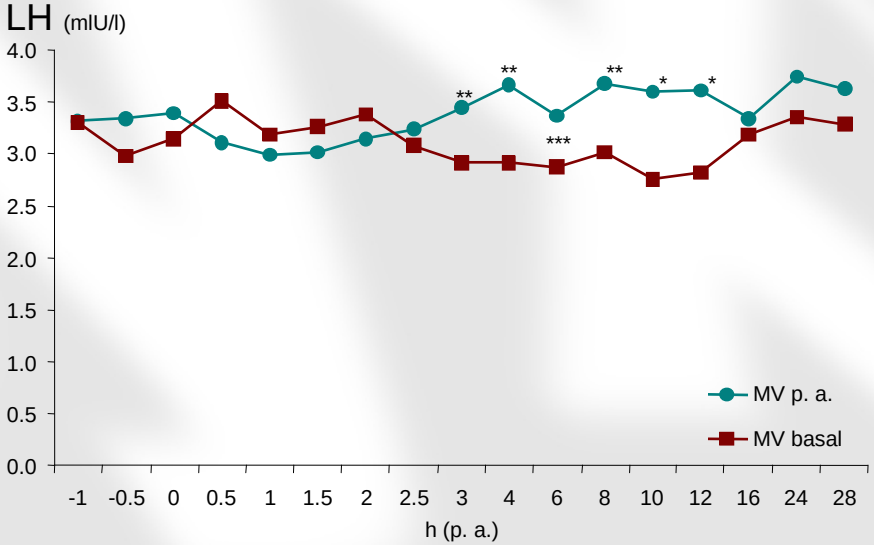
- Comparison estrus stimulation strategy January – July 2008 vs. January – July 2009
- Estrus stimulation 24 hours after weaning:

pluriparous sows:	
Group I PMSG (n = 6430)	In 2008: 800 IE PMSG s.c.
Group II Peforelin (n = 5422)	In 2009: 150 µg Peforelin i.m.
primiparous sows:	
Group III PMSG (n = 2062)	In 2008: 1000 IE PMSG s.c.
Group IV Peforelin (n = 1436)	In 2009: 37,5 µg Peforelin i.m.

Reproduction Control - the strategy to prevent SLS

Peforelin: a synthetic GnRH-Analoga inducing predominantly the release of FSH. Registered for oestrus stimulation in sows.

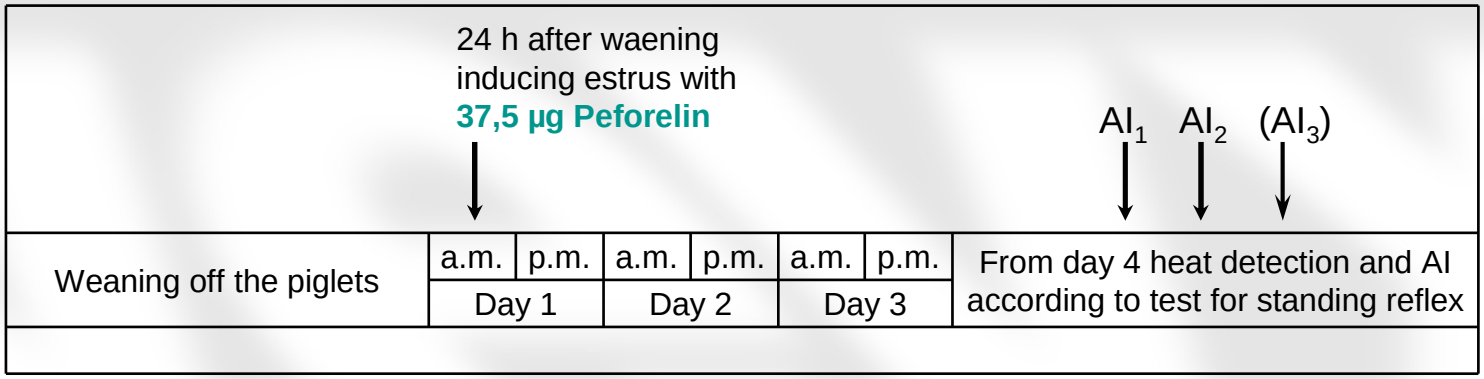




Source: Kauffold et al. 2004

Reproduction Control - the strategy to prevent SLS

Peforelin for primiparous sows



a.m. = morning, p.m. = afternoon.
Recommended insemination timing: AI_1 12 - 24 h after onset of estrus, AI_2 up to 18 h later. Sows with short weaning-to-estrus-interval and longer duration of estrus should be inseminated later than sows with a later onset of estrus. AI_3 can be performed in sows with extremely long duration of standing heat.

Reproduction Control - the strategy to prevent SLS

Results:

		Group I (2008 = PMSG)	Gorup II (2009 = Peforelin®)
Inseminated sows		6.430	5.422
Estrusrate*	n	5.837	4.986
	%	90,79 %[b]	91,96 %[a]
Pregnancy rate		93,30 %[b]	94,93 %[a]
Total born litters		5.768	4.883
Farrowing rate		89,70 %	90,06 %
Total born piglets/litter (TBP/litter)**		14,44	14,89
Live born piglets/litter (LBP/litter)**		12,94	13,17
Piglet-Index (TBP/100 inseminations)**		1.295	1.341
Piglet-Index (LBP/100 inseminations)**		1.161	1.186

[a, b]: Differences between the groups were significant ($p < 0,05$)

* Estrus up to day 6 after weaning

** no statistical analysis

Reproduction Control - the strategy to prevent SLS

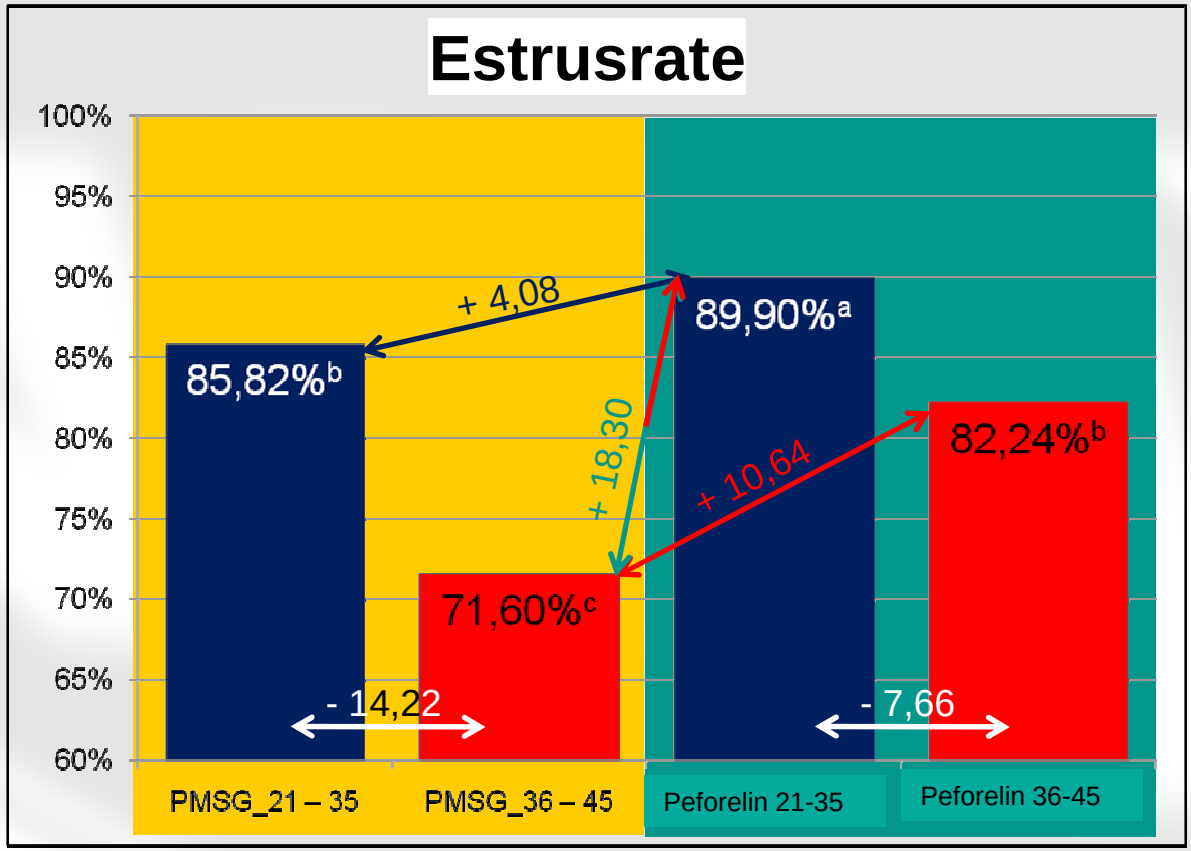
Results: primiparous sows

		Gruppe III (2008 = PMSG)	Gruppe IV (2009 = Peforelin)
Inseminated sows		2.062	1.436
Estrusrate*	n	1.660	1.250
	%	80,50 %[b]	87,05 %[a]
Farrowing rate		88,31 %	89,62 %
Total born piglets/litter (TBP/litter)**		13,79	14,62
Live born piglets/litter (LBP/litter)**		12,89	13,43
Piglet-Index (TBP/100 inseminations)**		1.218	1.310
Piglet-Index (LBP/100 inseminations)**		1.138	1.203

[a, b]: Differences between the groups were significant ($p < 0,05$)
* Estrus up to day 6 after weaning
** no statistical analysis

Reproduction Control - the strategy to prevent SLS

Results: primiparous sows



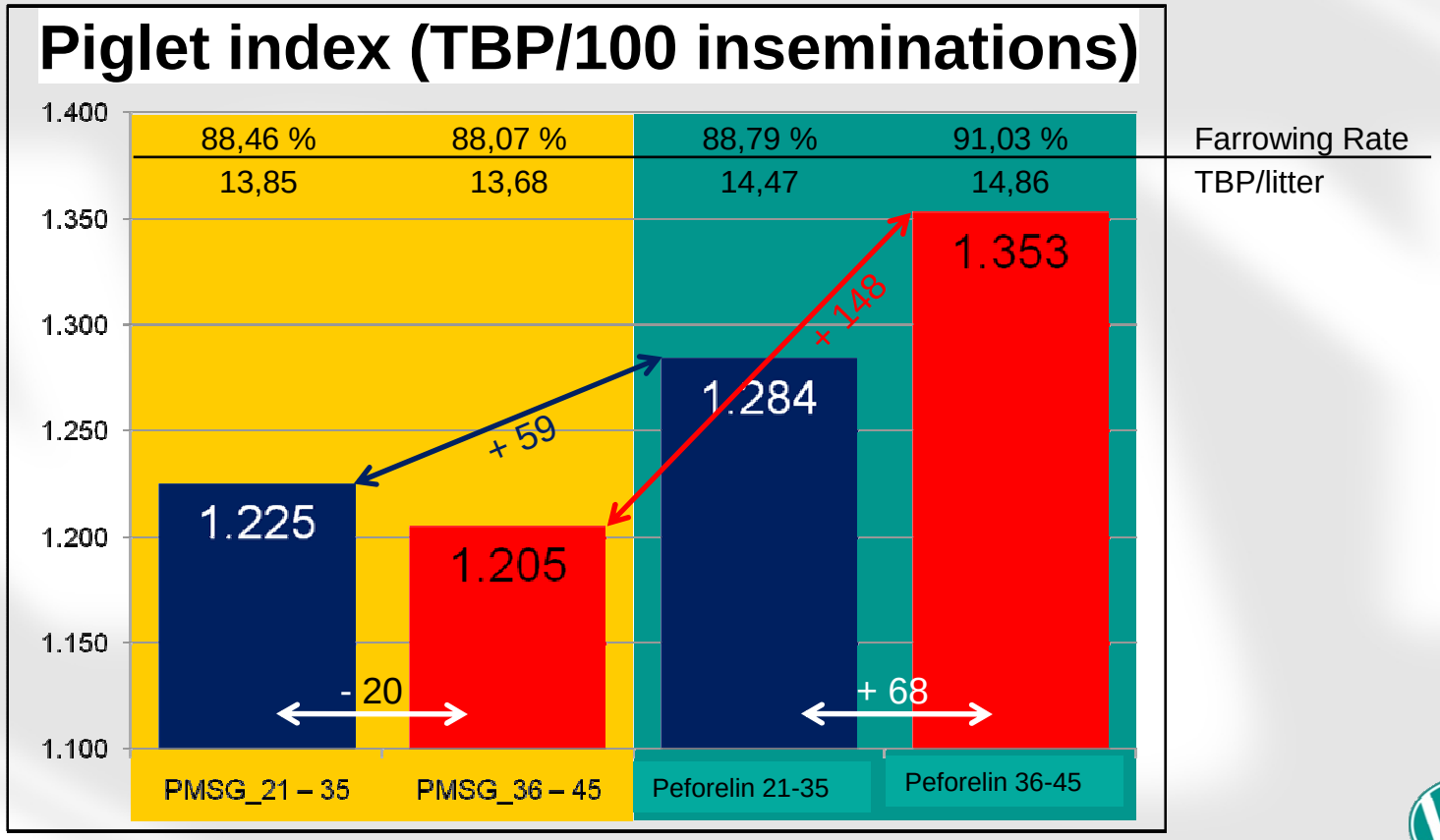
a, b, c: Differences between the the groups were significant ($p < 0,05$)

21 – 35 = Insemination between January and first decade of May

36 – 45 = Insemination between mid of May and July

Reproduction Control - the strategy to prevent SLS

Results: primiparous sows



No siginficant differences between the groups (p > 0,05), other parameters no statistical analysis

21 – 35 = Insemination between January and first decade of May

36 – 45 = Insemination between mid of May and July

Reproduction Control - the strategy to prevent SLS

Discusssion

- Differences between year, season, feed, staff ……..

- Average breeding progress:

  13,5 TBP/litter in 2006
  14,0 TBP/litter in 2007
  14,2 TBP/litter in 2008
  14,5 TBP/litter in 2009

- Reducing the herd size in 2008 and 2009 by an intensive selection on a high level

Reproduction Control - the strategy to prevent SLS

Estrus stimulation by Peforelin in primiparous sows:

- Increased estrus rate
- Trend to higher farrowing rate, litter size und piglet index
- Better results especially in warm insemination periods
- More physiological acting in the hypothalamus-hypophysis-ovary-axis
- Compensation of the physiological lack of GnRHrelease
- Useful strategy to compensate SLS

Conclusion

- SLS performs relevance for productivity and economics of a sow herd.
- SLS can be mainly detected in analysis of individual farms.
- SLS may be hidden behind pooled fertility analysis.
- SLS is widely dominated by the management.
- SLS can be limited by a strict gilt management including feeding, housing and animal health status.
- SLS can be prevented by establishing a modern reproduction controll programme

Conclusion

Second Litter Syndrome:
~~Threat~~ or Challenge~~?~~ !

Thank you very much for your attention!