

# Infectious and Non-infectious causes of poor reproductive performance in Sows

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# Road Map

- Little Introduction
- Genital Diseases
- Diagnostic Procedure
- „A“ Case
- Take Home Message

“More than **70 %** of a veterinarian’s duties on a sow farm is related to reproduction (*and thus the reproductive tract*).”

# Culling Reasons for Sows

	Infertility	Low Performance	Lameness	Death	Disease	Miscellaneous	Age
USA <sup>1</sup>	33.6	20.6	13.2	7.4	3.1	13.3	8.7
Finland <sup>2</sup>	30.9	15.4	13.9	4.2	4.6	18.8	13.2

<sup>1</sup> Lucia T et al. Proc 14th IPVS Congress 1996; 540

<sup>2</sup> Heinonen M et al. Anim Reprod Sci 1998; 52: 235-244



# Individual Level:

## Genital Diseases as revealed by Gross-Morphology of Cull Sows

Genital Condition	Reference		
	(A) (n = 1.404)	(B) (n = 1.708)	(C) (n = 499)
	n (%)	n (%)	n (%)
Intact	512 (36.5)	894 (53.3)	na
Diseased	892 (63.5)	814 (47.7)	na
Cervicitis	na	na	12 (2.4)
Ovarian	na	428 (52,6)	29 (5.8)
Inactivity/Atrophia			
Ovarian Cysts (single, multiple)	64 (7.2)	106 (13,0)	50 (10.0)
Ovarian Tumors	4 (0.4)	13 (1.6)	kA
Ovarian Adhesions	493 (55.3)	19 (2.3)	kA
Paraovarian Cysts	93 (10.4)	392 (48.2)	16 (3.2)
Congenital	8 (0.9)	14 (1.7)	8 (1.6)
Abnormalities			
Uterine Diseases	192 (21.5)	22 (2.7)	41 (8.2)
Tubal Diseases	kA	3 (0.4)	9 (1.8)

<sup>A</sup> Percentages given relative to diseased sows only; <sup>B</sup> Percentages given relative to all sows (i.e. intact and diseased)

# Sow Herd Level:

Common Problems (related to production parameters)

Low Conception/Farrowing Rate

Late Fallout

Low Litter Size

Delayed/No Puberty Attainment

Vulval Discharge

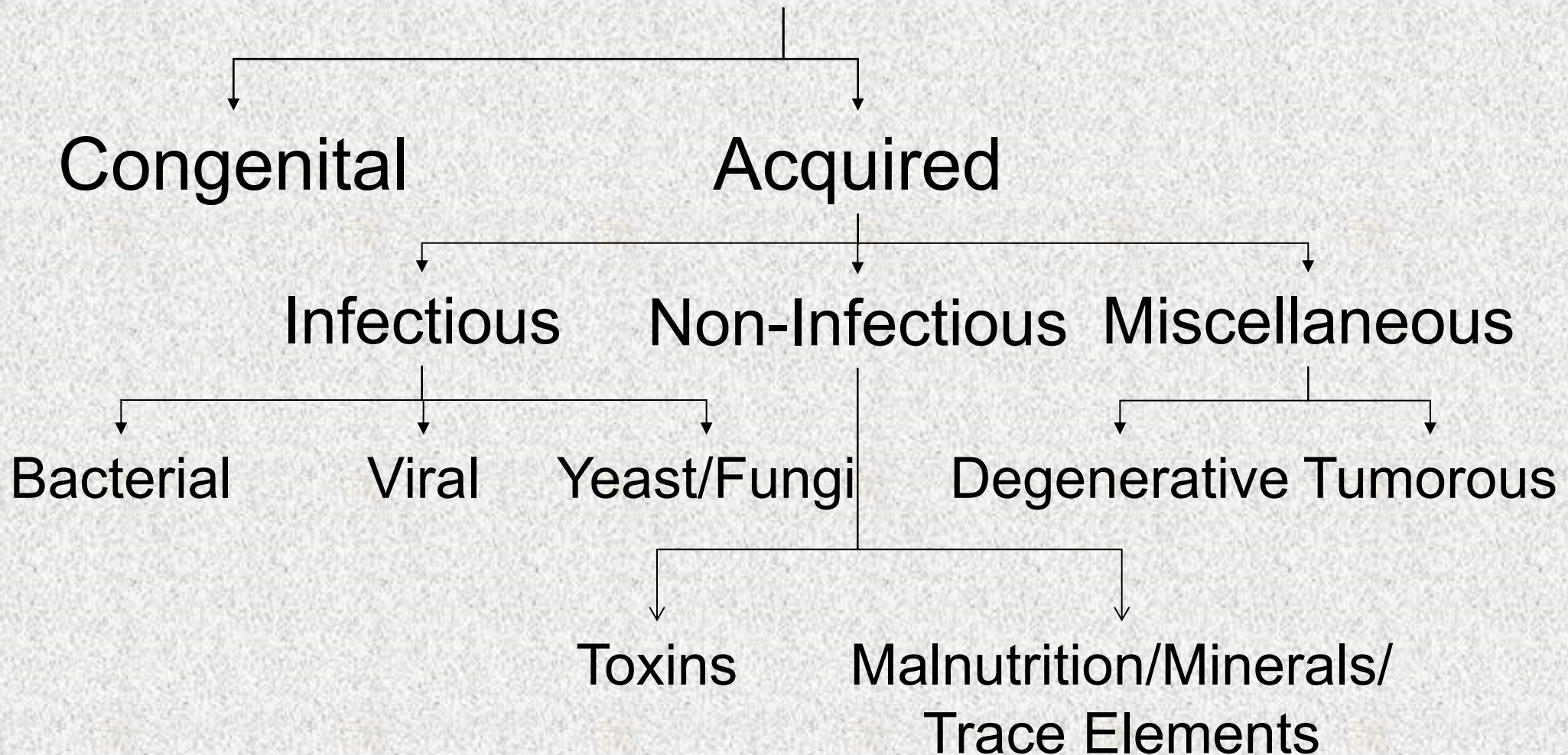
Long Wean-Estrus-Interval

Regular/Irregular Return to Estrus

Embryonic Mortality/Abortion

MMA

# Reproductive disorders



# Cervix/Vagina – Infectious

## Genital diseases as revealed by gross-morphology of cull sows

Genital Condition	Reference		
	(28) (n = 1.404) <sup>A</sup>	(34) (n = 1.708) <sup>A</sup>	(11) (n = 499) <sup>B</sup>
	n (%)	n (%)	n (%)
Intact	512 (36.5)	894 (53.3)	na
Diseased	892 (63.5)	814 (47.7)	na
Cervicitis	na	na	12 (2.4)
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Paraovarian Cysts	93 (10.4)	392 (48.2)	16 (3.2)
Congenital Abnormalities	8 (0.9)	14 (1.7)	8 (1.6)
Uterine Diseases	192 (21.5)	22 (2.7)	
Tubal Diseases	kA	3 (0.4)	

<sup>A</sup> Percentages given relative to diseased sows only; <sup>B</sup> relative to all sows (i.e. intact and diseased)

19/824 (2.3%) with discharge due to inflammation of the cervix/vagina (*Oravainen et al. Reprod Dom Anim 2006;41:549–554*)



# Ovary – Congenital



Gilt (cyclic, but  
never pregnant)

## Ovotestis



# Ovary – Infectious

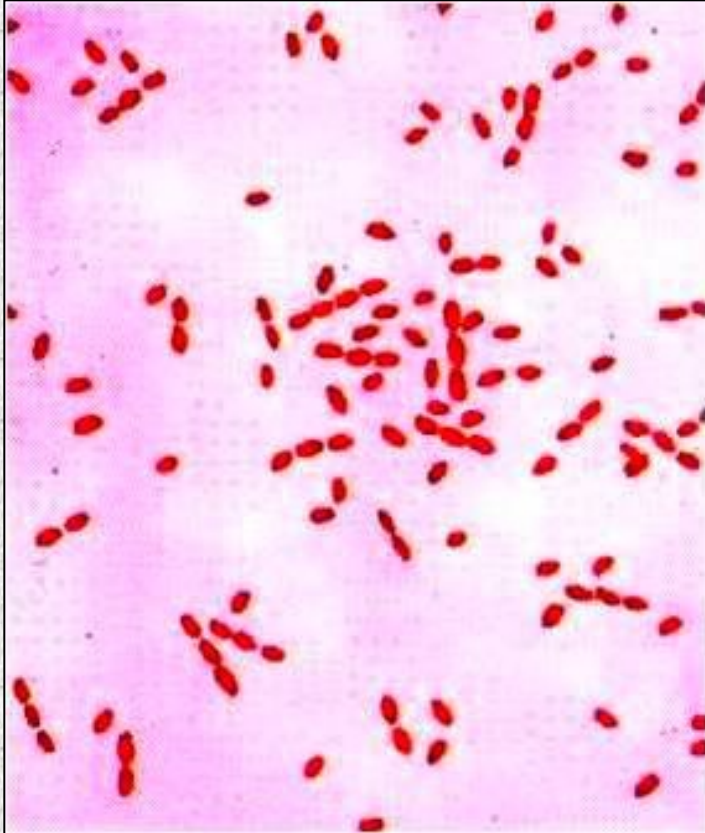
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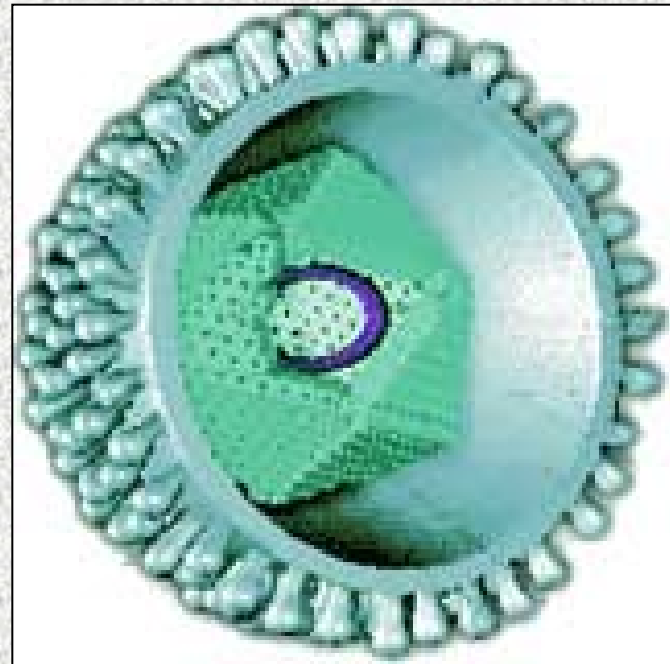
<sup>A</sup> Percentages given relative to diseased sows only; <sup>B</sup> Percentages given relative to all sows (i.e. intact and diseased)

# Ovary – Infectious

*Brucella*

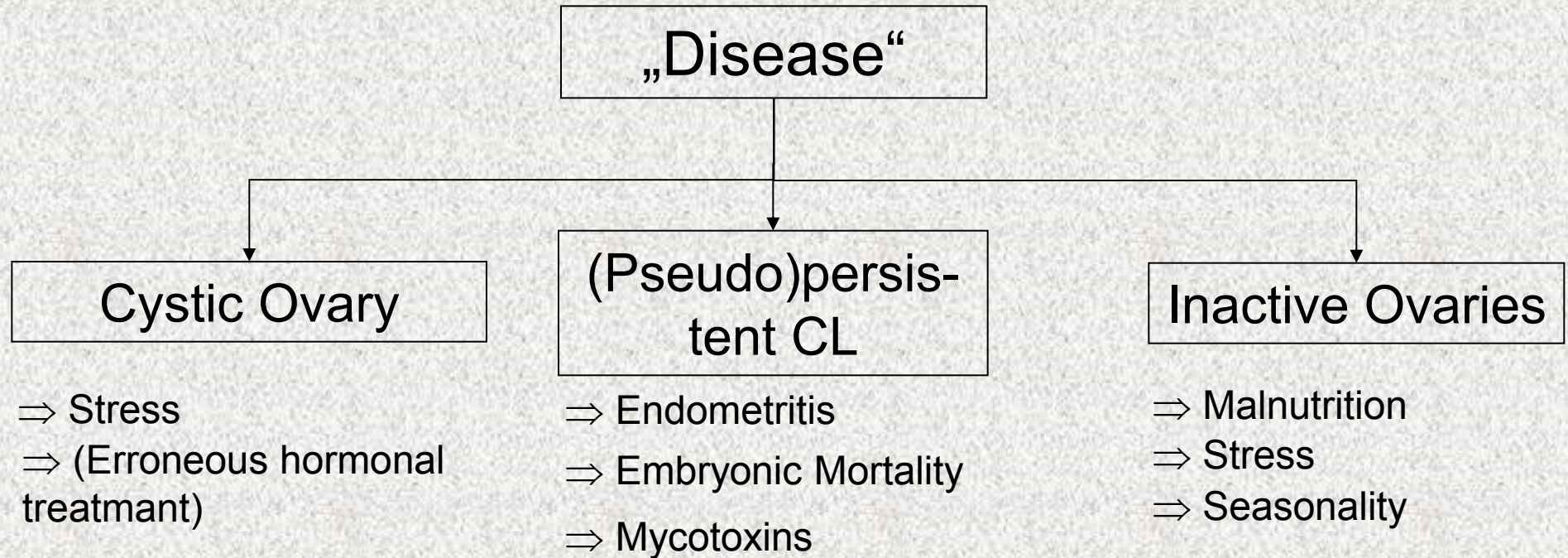


*Pseudorabies*





# Ovary – Non-Infectious





# Own Results

Ultrasonographic findings of the ovaries in non-pregnant first served sows examined between days 20 and 114 postinsemination ( $n = 223$ )

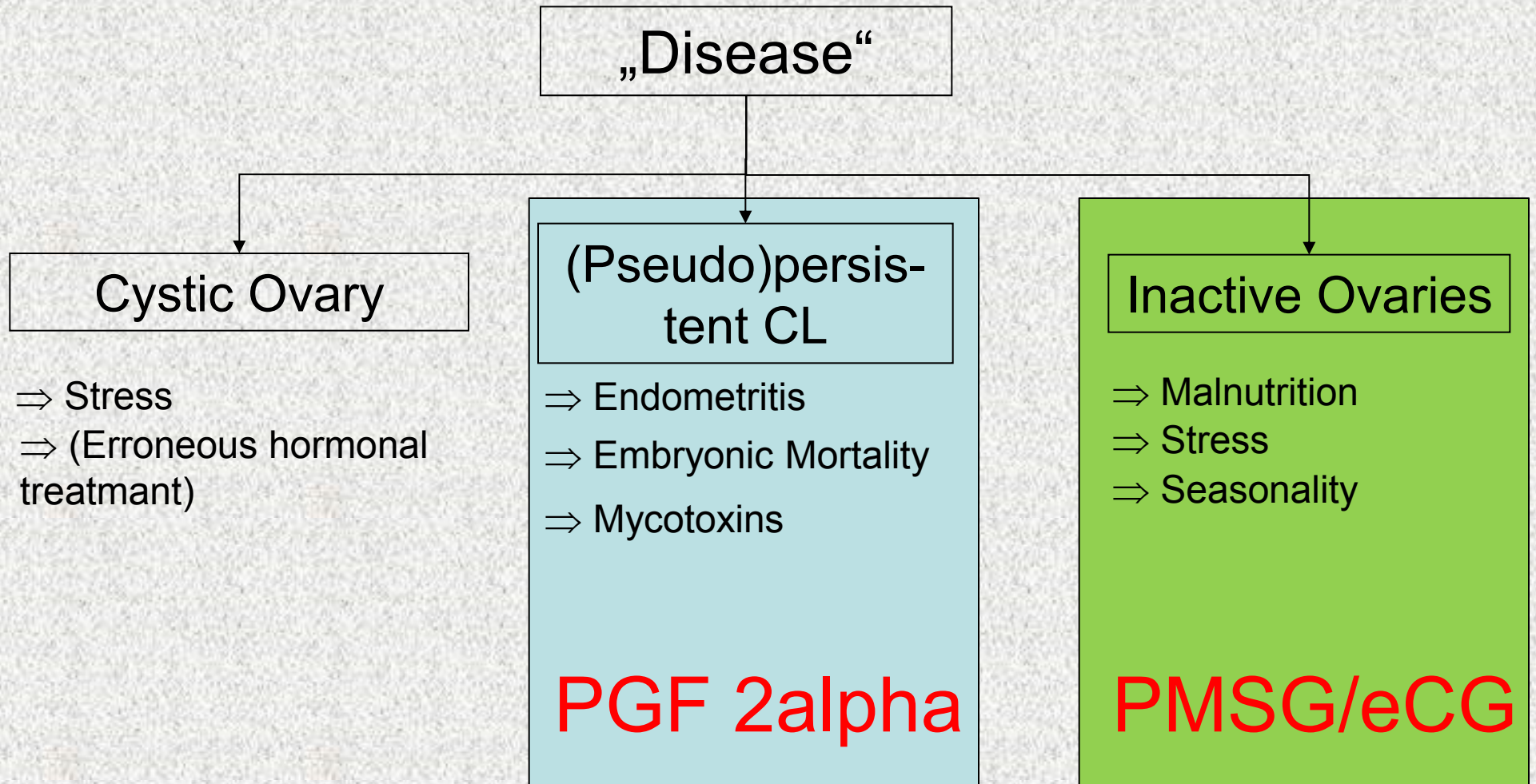
Ultrasonographic findings	Days post-insemination				Total* ( $n = 223$ )
	20–25 ( $n = 95$ )	26–37 ( $n = 83$ )	38–46 ( $n = 20$ )	47–114 ( $n = 25$ )	
CL ( $n/\%$ )	37/38.9 <sup>a</sup>	39/47.0 <sup>a</sup>	11/55.0 <sup>a</sup>	17/68.0 <sup>a</sup>	104/46.6 <sup>a</sup>
F <sub>2–6</sub> ( $n/\%$ )	34/35.8 <sup>a,b,A</sup>	25/30.1 <sup>a,b,A</sup>	3/15.0 <sup>b,A,B</sup>	1/4.0 <sup>b,B</sup>	63/28.3 <sup>b</sup>
POS ( $n/\%$ )	21/22.1 <sup>b</sup>	16/19.3 <sup>b</sup>	2/10.0 <sup>b</sup>	4/16.0 <sup>b</sup>	43/19.3 <sup>c</sup>
POD ( $n/\%$ )	3/3.2 <sup>c,C</sup>	3/3.6 <sup>c,B,C</sup>	4/20.0 <sup>a,b,A</sup>	3/12.0 <sup>b,A,B</sup>	13/5.8 <sup>d</sup>

Ultrasonographic findings of the ovaries in non-pregnant first served gilts examined between days 20 and 114 postinsemination ( $n = 104$ )

Ultrasonographic findings	Days post-insemination				Total* ( $n = 104$ )
	20–25 ( $n = 41$ )	26–37 ( $n = 42$ )	38–46 ( $n = 10$ )	47–114 ( $n = 11$ )	
CL ( $n/\%$ )	21/51.2 <sup>a</sup>	23/54.8 <sup>a</sup>	5/50.0 <sup>a</sup>	8/72.7 <sup>a</sup>	57/54.8 <sup>a</sup>
F <sub>2–6</sub> ( $n/\%$ )	15/36.6 <sup>a</sup>	14/33.3 <sup>a</sup>	2/20.0 <sup>a,b</sup>	3/27.3 <sup>a,b</sup>	34/32.7 <sup>b</sup>
POS ( $n/\%$ )	5/12.2 <sup>b</sup>	4/9.5 <sup>b</sup>	3/30.0 <sup>a,b</sup>	0 <sup>b</sup>	12/11.5 <sup>c</sup>
POD ( $n/\%$ )	0 <sup>c</sup>	1/2.4 <sup>b</sup>	0 <sup>b,c</sup>	0 <sup>b</sup>	1/1.0 <sup>d</sup>

CL: corpora lutea; F<sub>2–6</sub>: follicles of 2–6 mm in diameter; POS: peri-ovulatory ovarian structures (including follicles of 7–8 mm in diameter and corpora haemorrhagica); POD: polycystic ovarian degeneration (multiple cysts without CL). The superscript letters (a–c) indicate that the values are significantly different within a column ( $P < 0.05$ ). There were no significant differences within a row. Asterisk (\*) indicates the values that are not in statistical testing within a row.

# Ovary – Non-Infectious



# Cystic Ovaries

## **Number**

*Single cysts - 5 – 20%*

*Oligo-cystic ovarian degeneration (many, but not only) - 8 – 30%*

*Poly-cystic ovarian degeneration (many, only) - 0.5 – 2%*

## **„Quality“**

*Follicle-Theca/-Lutein-Cysts*

*Lutein-Cysts*

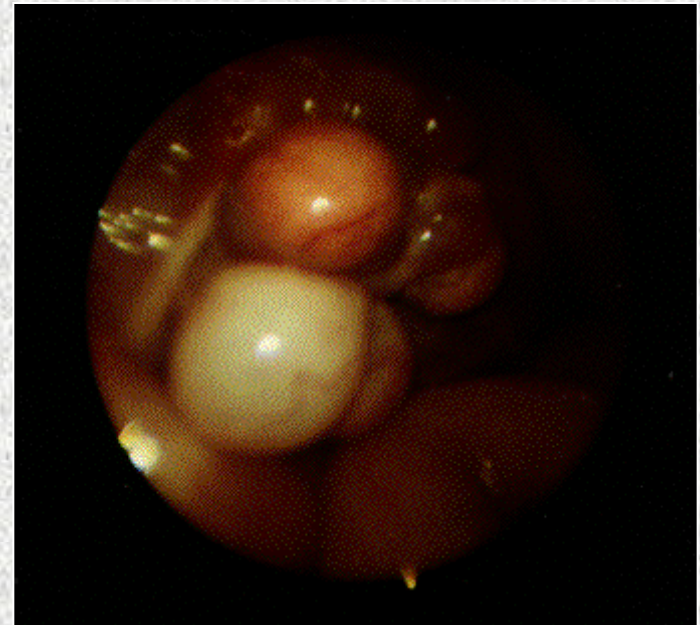
*„Blood-Follicles“*



# Cystic Ovaries



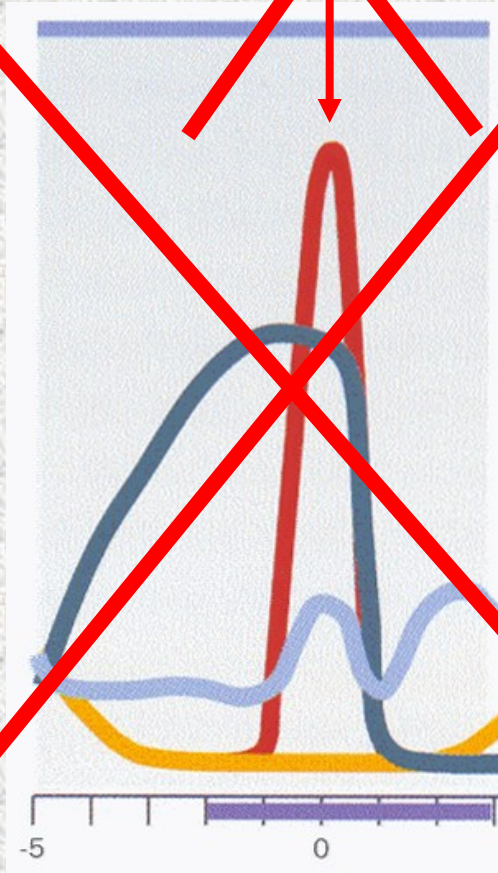
[http://www.pig333.com/photo-of-the-week/26-Apr-2012\\_21/](http://www.pig333.com/photo-of-the-week/26-Apr-2012_21/)





# Cystic Ovaries - Pathogenesis

GnRH



*Poly-/Oligo-cystic  
ovarian degeneration*

*As the result of (eg)  
Stress  
Diseases  
Malnutrition*

# Cystic Ovaries - Consequences

✓ *Depends on Number rather than „Quality“*

Single Cysts  $\Rightarrow$  No problem

Oligo-cystic ovarian degeneration

Reduced litter size

Reduced pregnancy rate

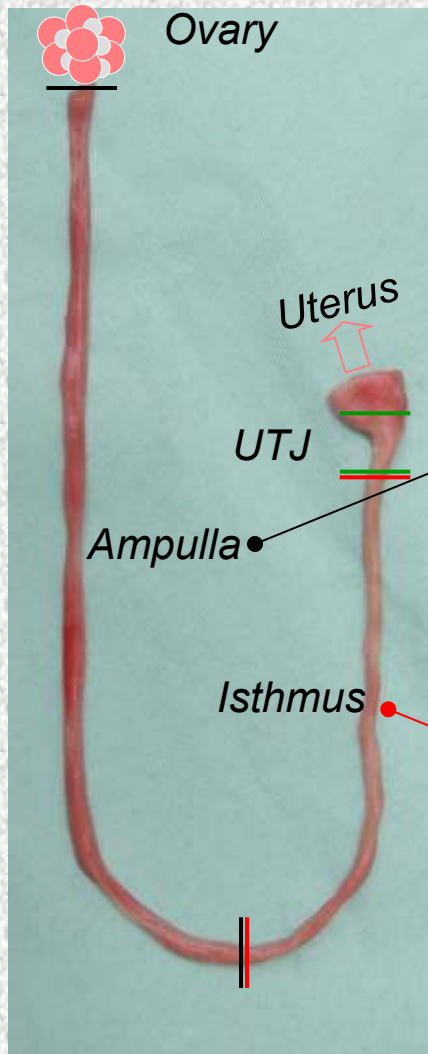
More returns

Poly-cystic ovarian degeneration

Infertility



# Oviduct - Infectious



HE x 10

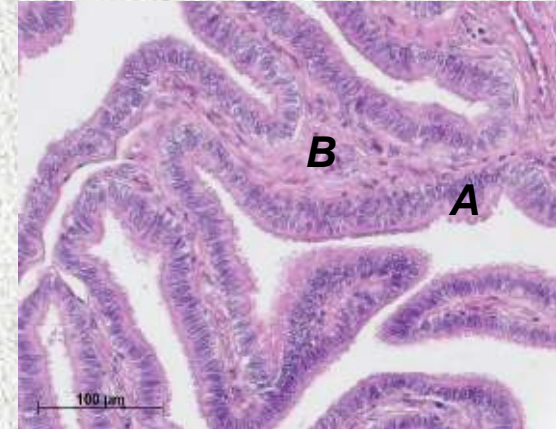


HE x 40

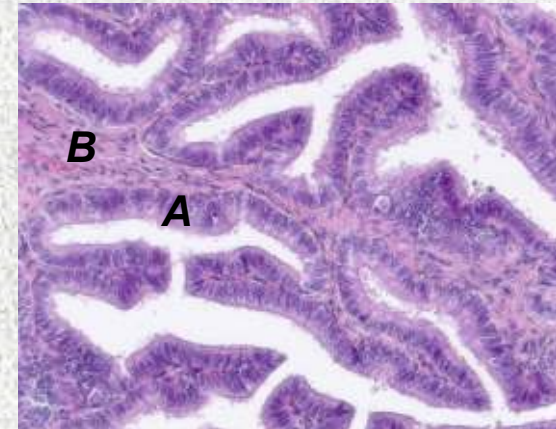


A = Serosa  
B = Muscularis  
C = Mucosa

HE x 200



HE x 200



A = Lamina epithelialis  
B = Lamina propria

# Oviduct - Infectious

## Tubal diseases in cull sows

	Hafez, 1962 <sup>1</sup>	Kaminski, 1979 <sup>2</sup>	Heinonen et al., 1997 <sup>2</sup>
Uni- or bilateral tubal occlusion	--	14.9 %	0.4 %
Pyo- or Hydrosalpinx	31.3 % (JS) 3.6 % (AS)	--	--



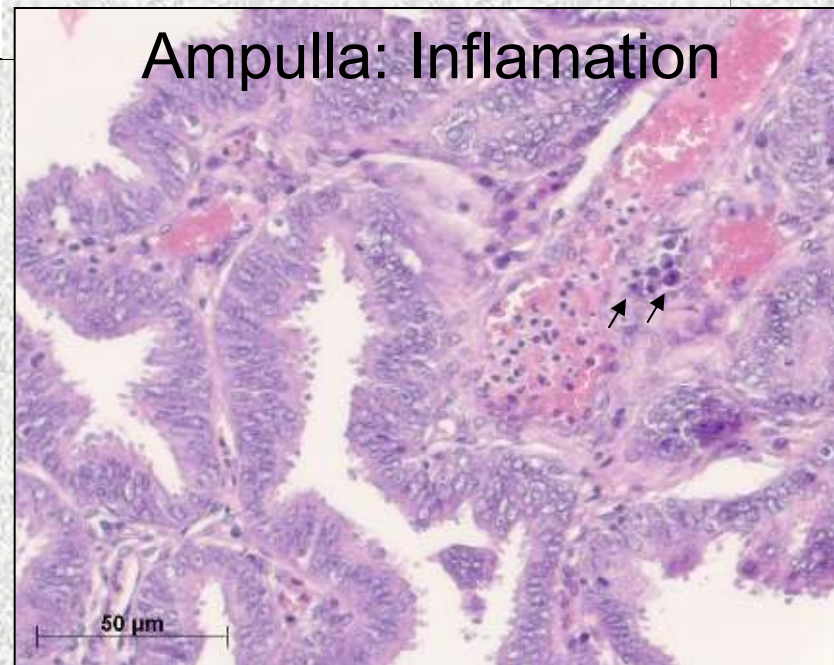


# Oviduct - Infectious

*(n = 40 repeat breeders ; 26 sows, 14 gilts)*

## Salpingitis

Total	Ampulla	Isthmus
n (%)	n	n
24 (60,0)	24	10



# Oviduct - Infectious

## ➤ Pathogenesis

- ✓ secondary as the result of ascending infection from the uterus
- ✓ primary?



Results of examination of oviducts and uteri of repeat breeder pigs for chlamydiae by nested PCR ( $n = 42$ )

Chlamydia positive					Chlamydia negative	
Total <sup>a</sup> (n, %)	Oviduct				Uterus	Total <sup>c</sup> (n, %)
	Total <sup>b</sup> (n, %)	Ampulla (n)	Isthmus (n)	UTJ (n)	Total (n, %)	
26 (61.9)	19 (45.2)	9	13	13	14 (33.3)	16 (38.1)

UTJ: utero-tubal junction.

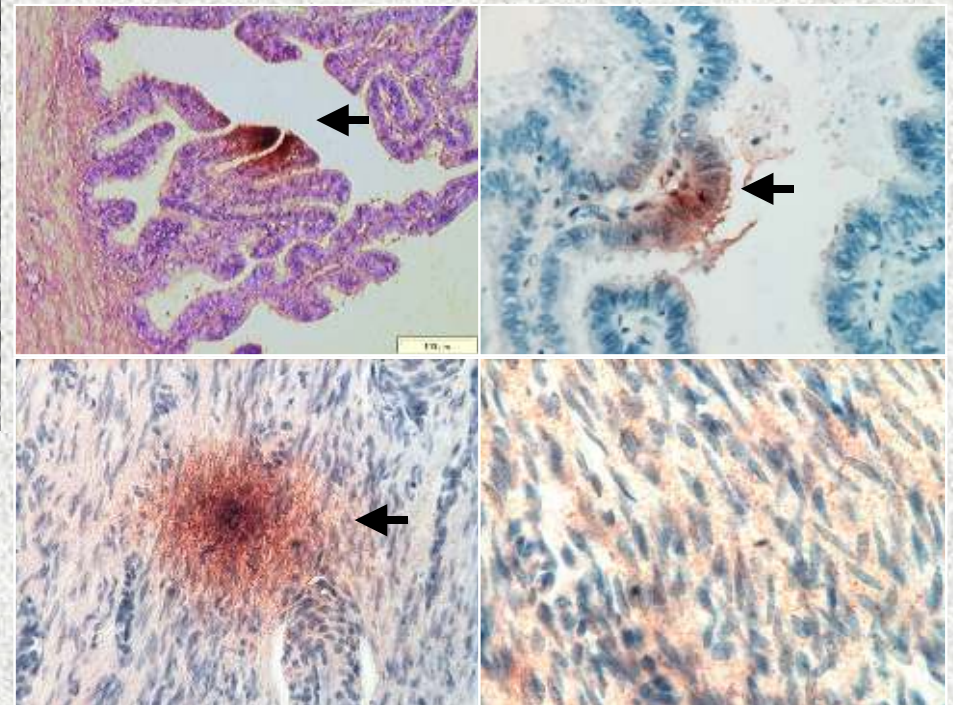
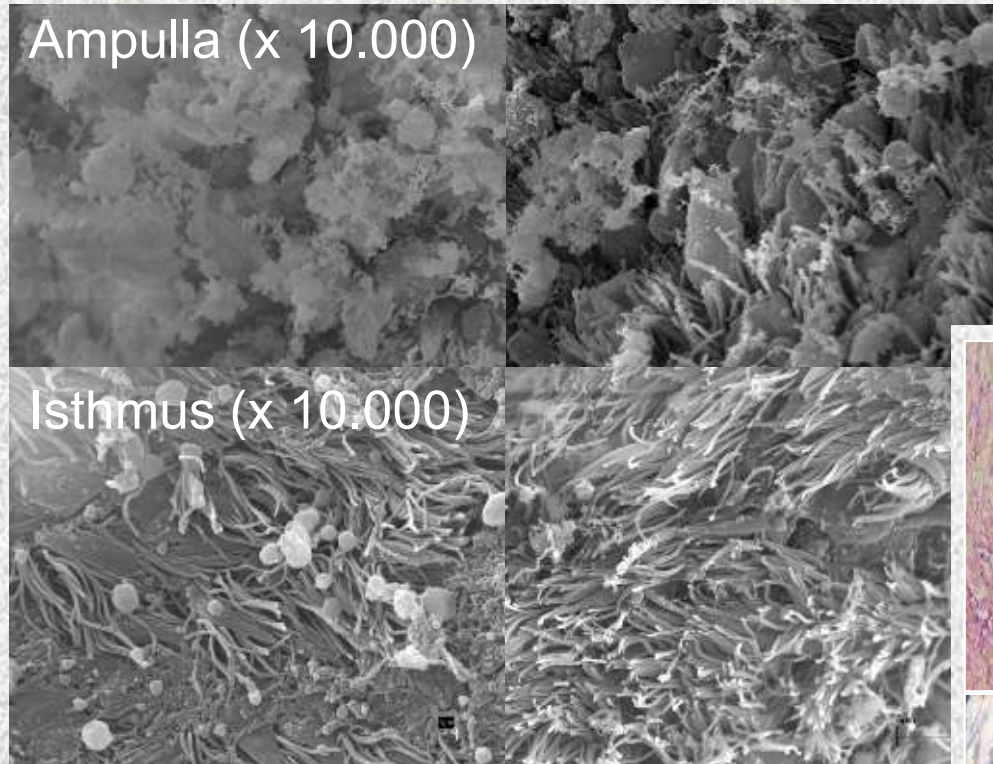
<sup>a</sup> Positive in the oviduct and/or uterus.

<sup>b</sup> Positive in one or more segments of one or both oviducts.

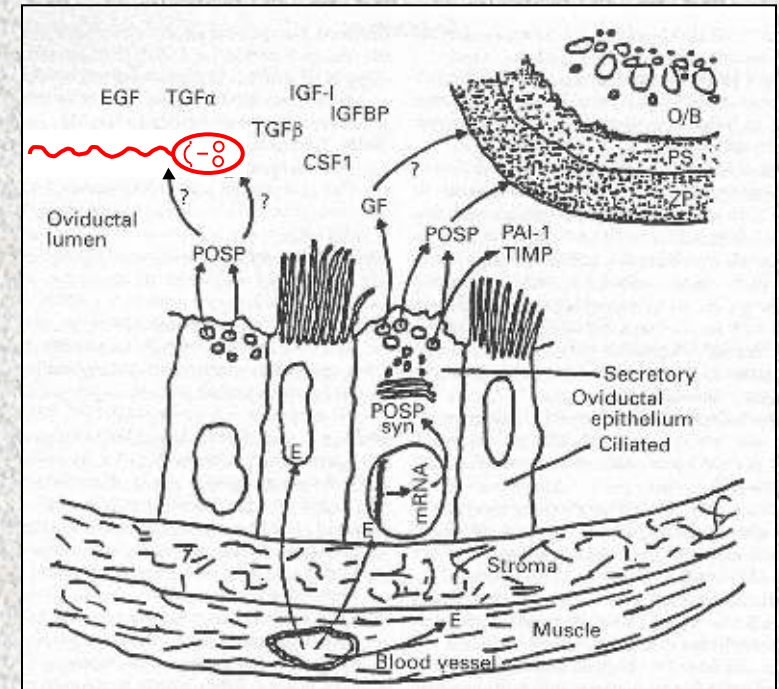
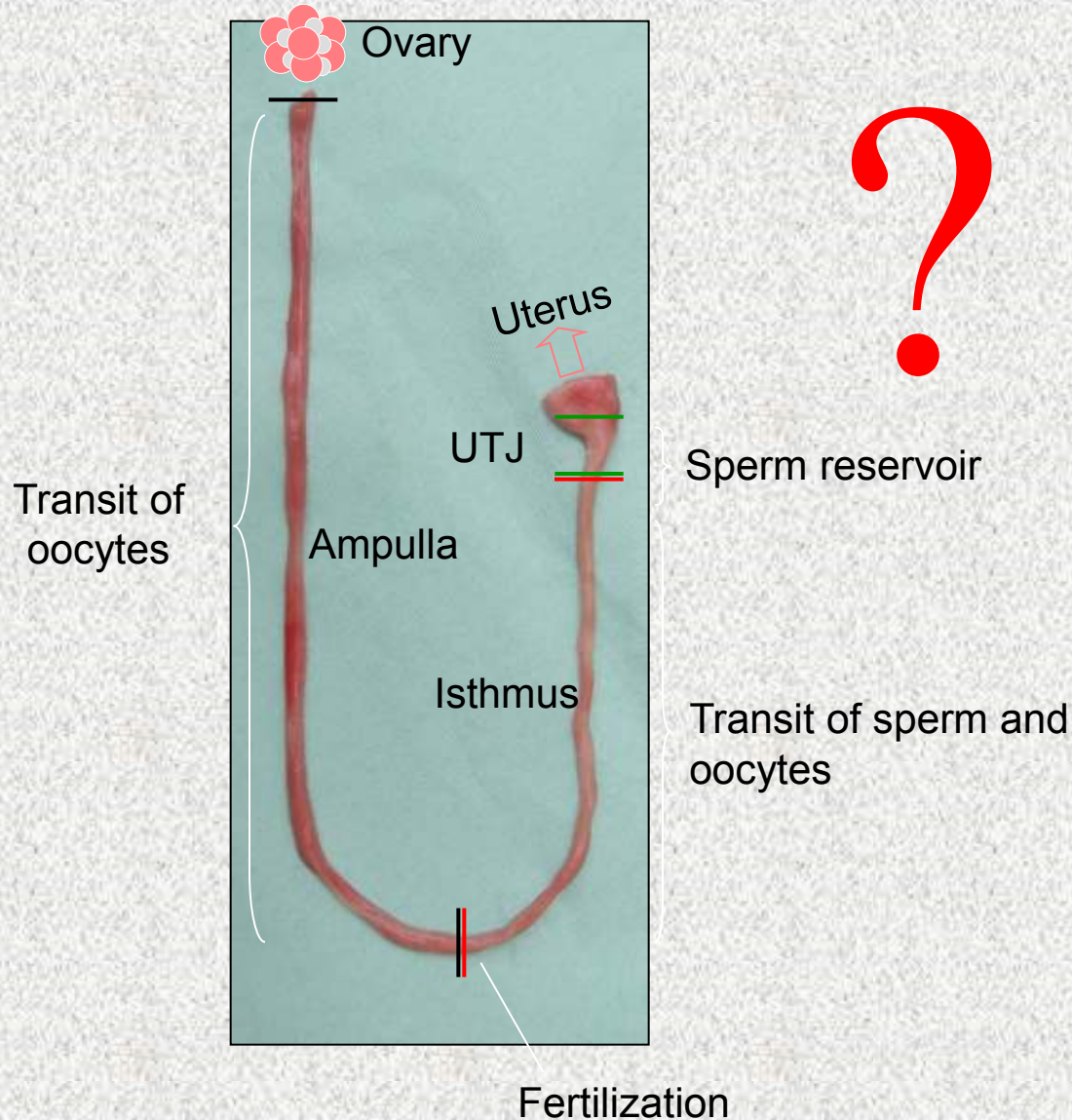
<sup>c</sup> Neither in oviducts nor in uteri.



# Oviduct - Infectious



# Oviduct - Infectious



Synthesis/Secretion of growth factors, proteins etc.

(Buhi et al. *J Reprod Fertil* 1997;52 (Suppl):285-300)

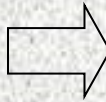


# Oviduct – Non-Infectious

Oviduct Porcine Epithelial Cells

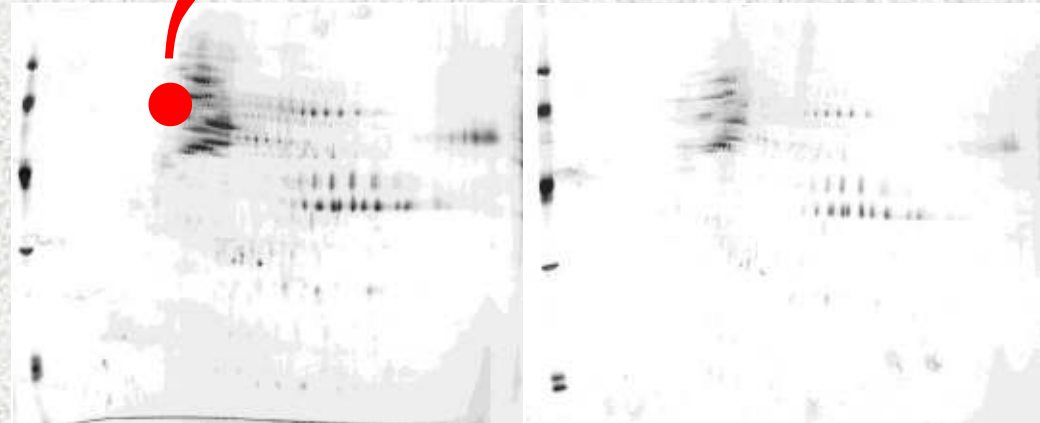


hTERT-Immortalization



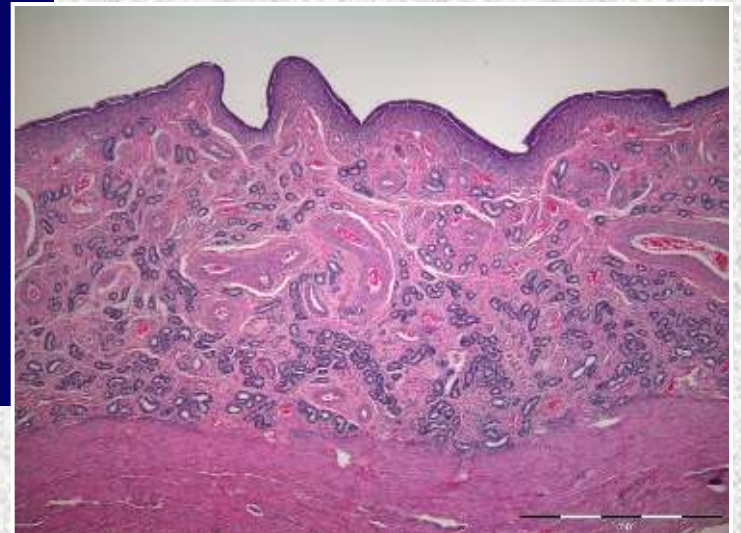
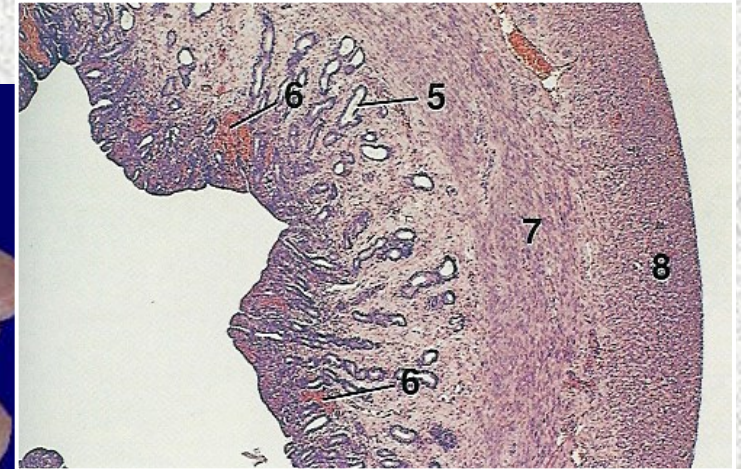
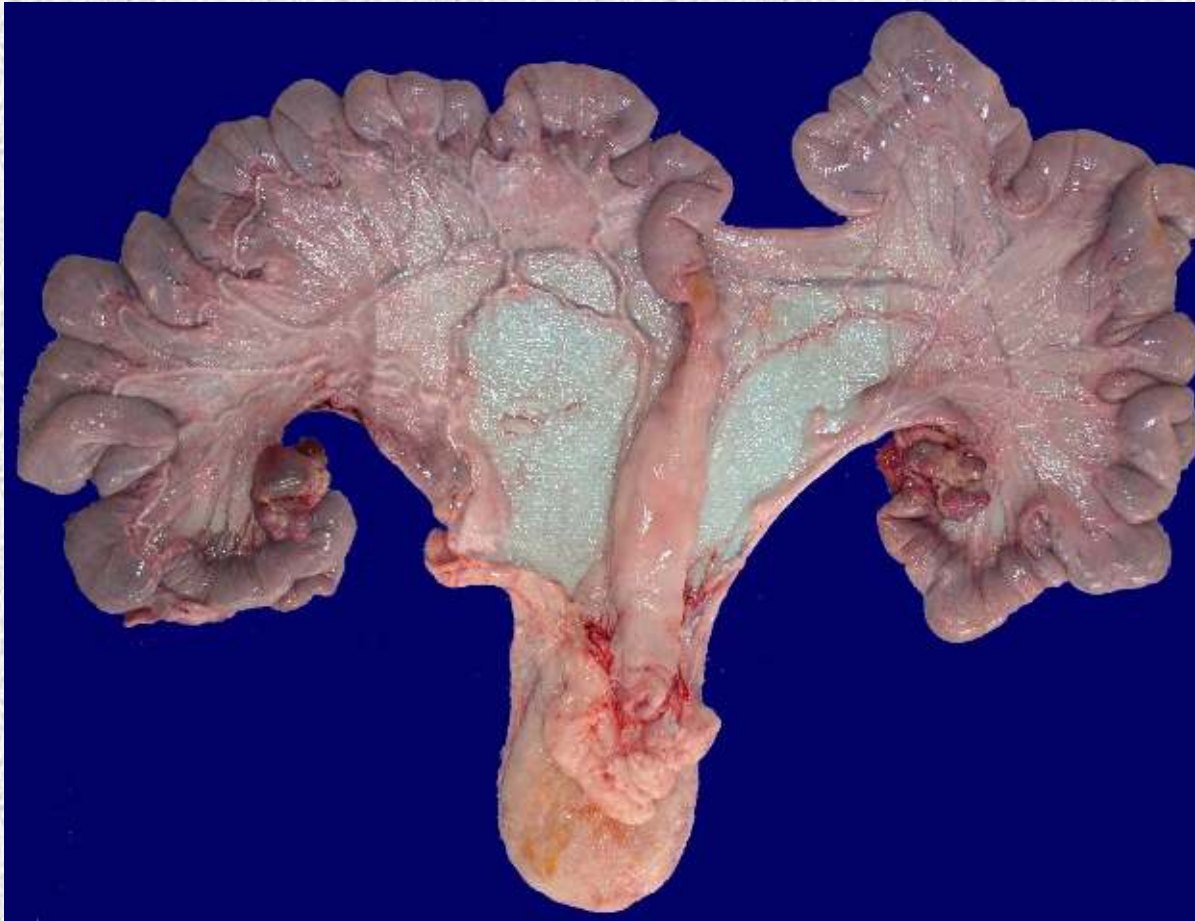
Zearalenon  
(20 µg/ ml; 24h)

DMSO  
(Control)



2D-Gel-Electrophoresis

# The Uterus





# Uterine Disease - Tumorous



Minipig

8 years

bloody discharge

Uterus 4.5 kg

Adenocarcinoma





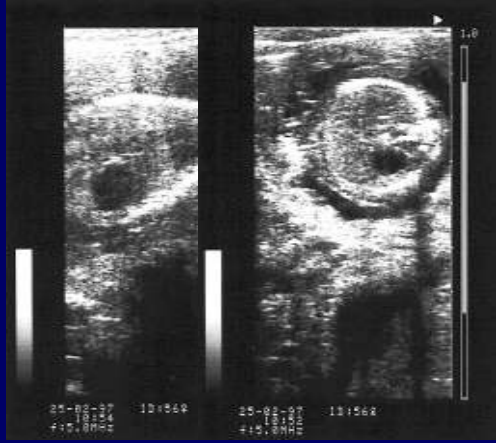
# Uterine Inflammation

## Endometritis

- 29/108 (27.0 %) *Dalin et al., 1997*
  - ~ 50 % mild
- 86/216 (40.2 %) *Bange, 2000*
  - ~ 50 % slight
- 43/45 (95.6 %) *Kauffold et al., 2006*
  - ~ 98 % chronic

# Uterine Inflammation

Sterile



Invasion



Sterile



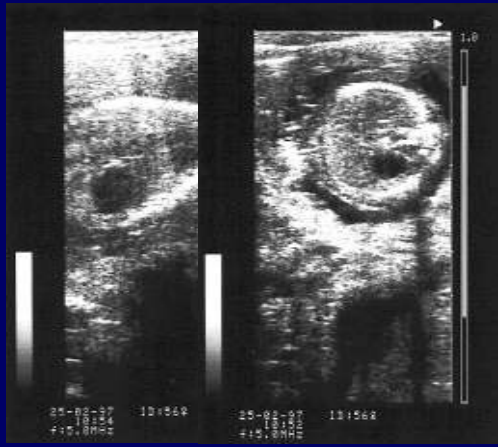
# Uterine Inflammation

- ⇒ Sow/Gilt (Vagina, Bladder, Skin)
- ⇒ Feces
- ⇒ Environment/ Equipment/  
Personnel
  
- ⇒ Boar (Prepuce)
- ⇒ Ejaculate/Semen

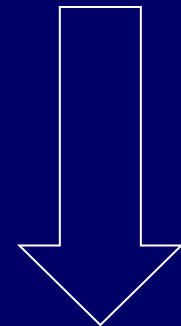
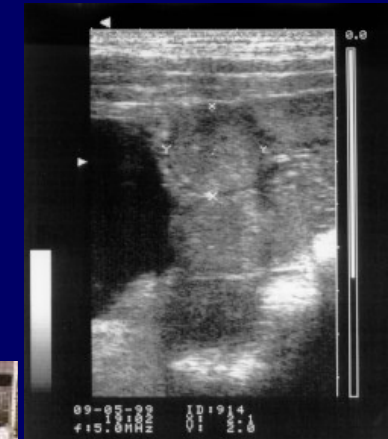


# Uterine Inflammation

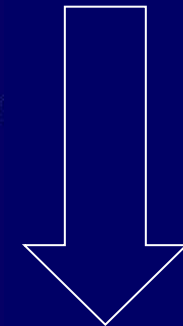
Sterile



Sterile

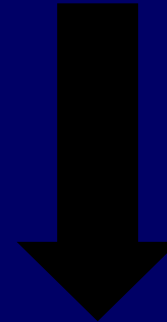
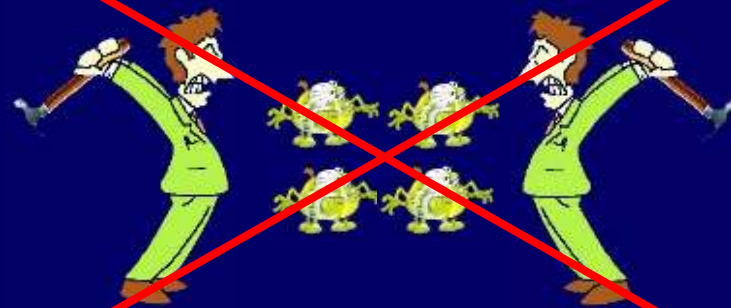
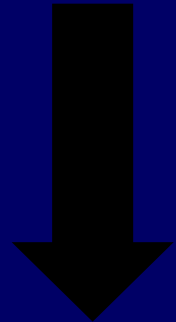


21 d pp



Hours

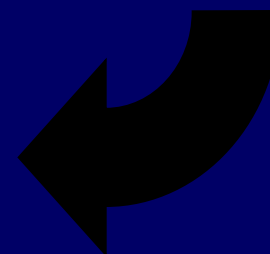
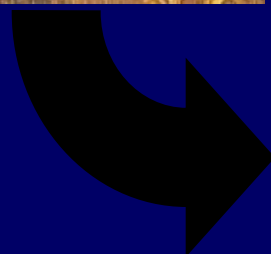
← Sterile →

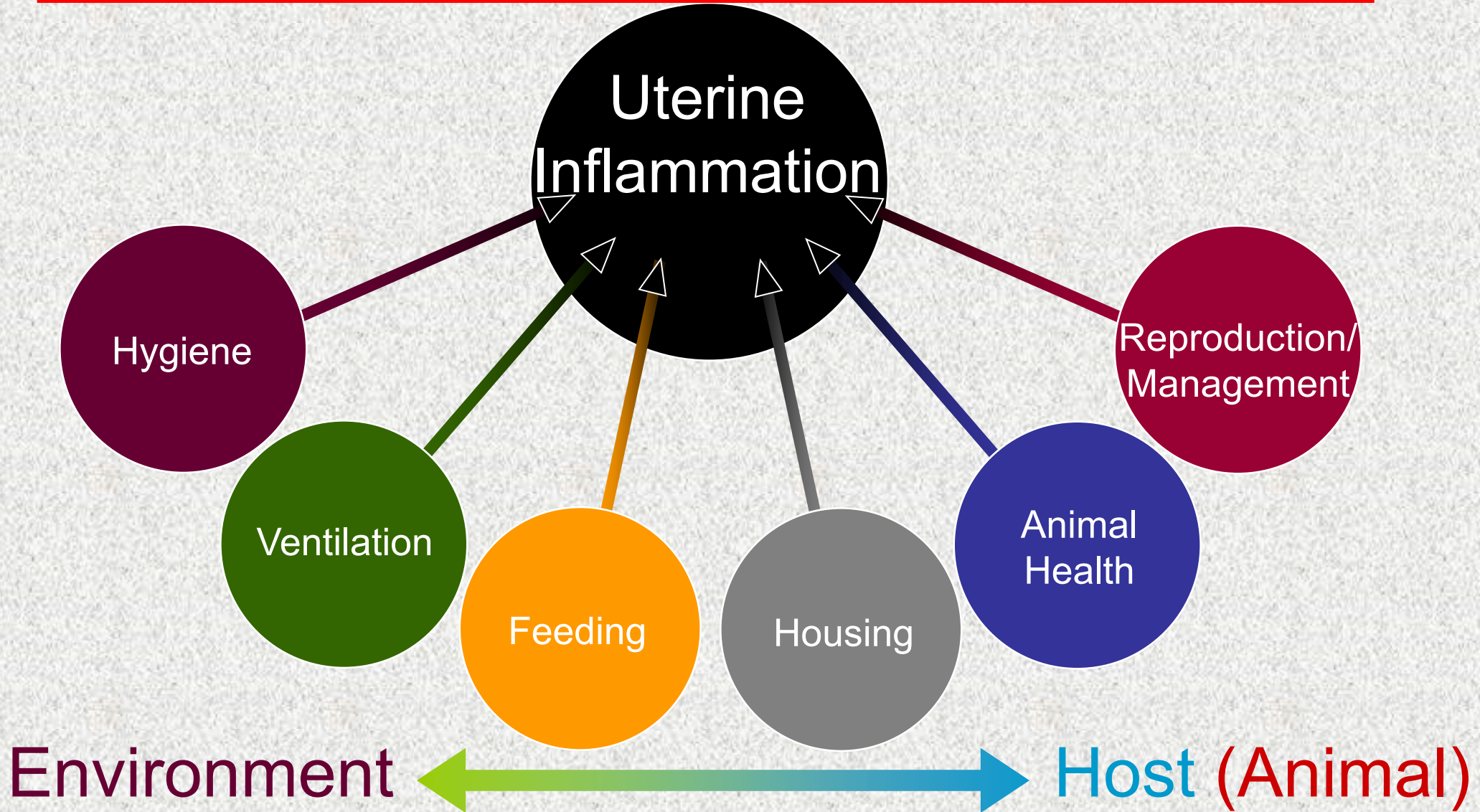
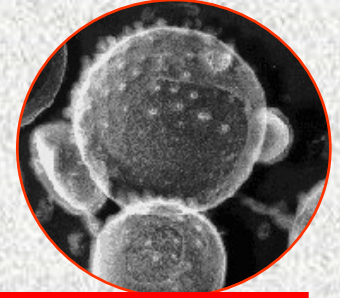


Acute (clinical)  
Endometritis



Chronic  
Endometritis





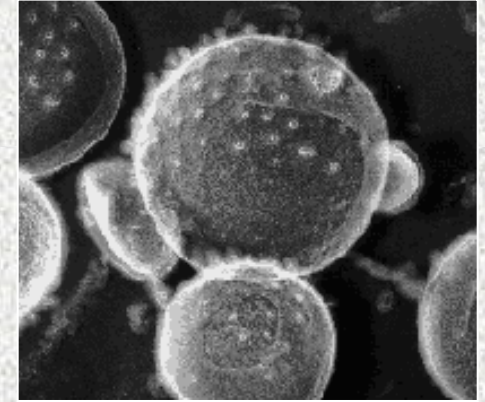


# Uterine Inflammation

Results of microbiological investigation of genital specimens  
(399 genital tracts, 121 farms)

Group	% Specimens positive			
	2005	2006	2007	Total
E. coli	66.6	78.9	90.5	76.1
Aeromonas hydrophila	21.8	43.2	44.4	32.8
Streptococcus	14.1	11.6	14.3	13.4
Proteus mirabilis	7.1	7.4	7.9	7.3
Others	13.5	12.6	17.5	14.0
Chlamydia	12.8	11.6	3.2	10.5

# Uterus - Infectious



Results of examination of oviducts and uteri of repeat breeder pigs for chlamydiae by nested PCR ( $n = 42$ )

Chlamydia positive						Chlamydia negative
Total <sup>a</sup> (n, %)	Oviduct				Uterus	Total <sup>c</sup> (n, %)
	Total <sup>b</sup> (n, %)	Ampulla (n)	Isthmus (n)	UTJ (n)	Total (n, %)	
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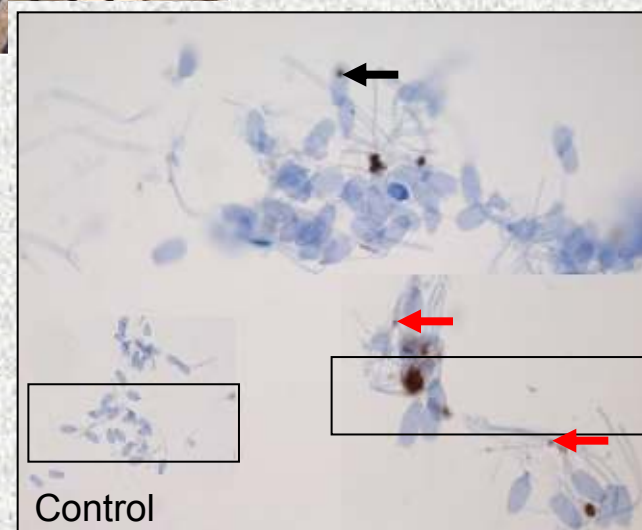
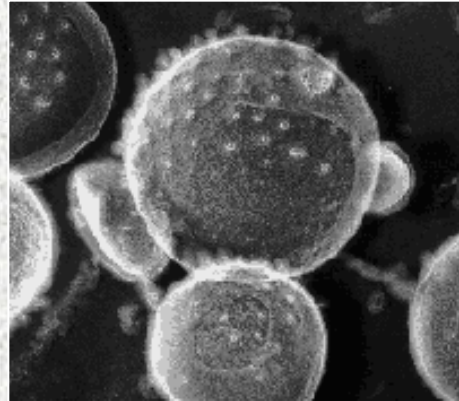
UTJ: utero-tubal junction.

<sup>a</sup> Positive in the oviduct and/or uterus.

<sup>b</sup> Positive in one or more segments of one or both oviducts.

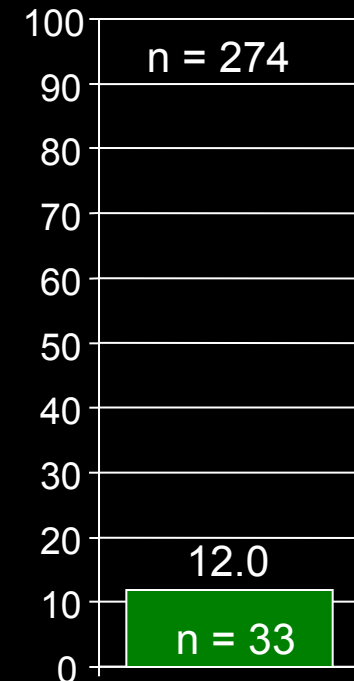
<sup>c</sup> Neither in oviducts nor in uteri.

# Uterine Inflammation



← Tail      ← Head

Percent (%)

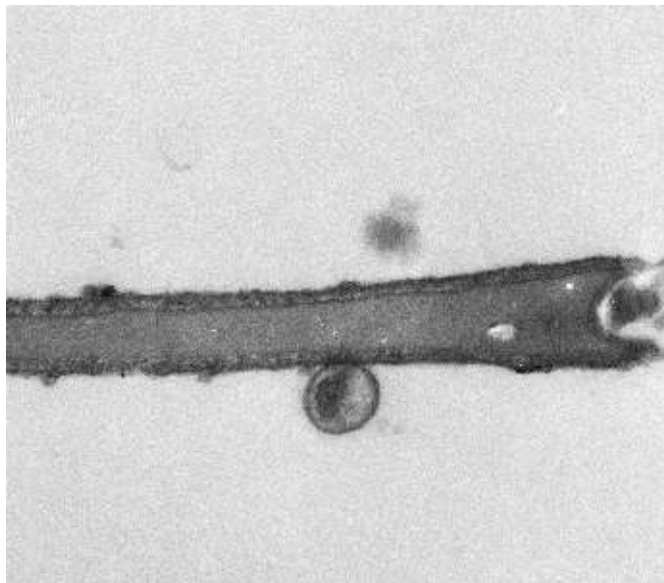


PCR positive

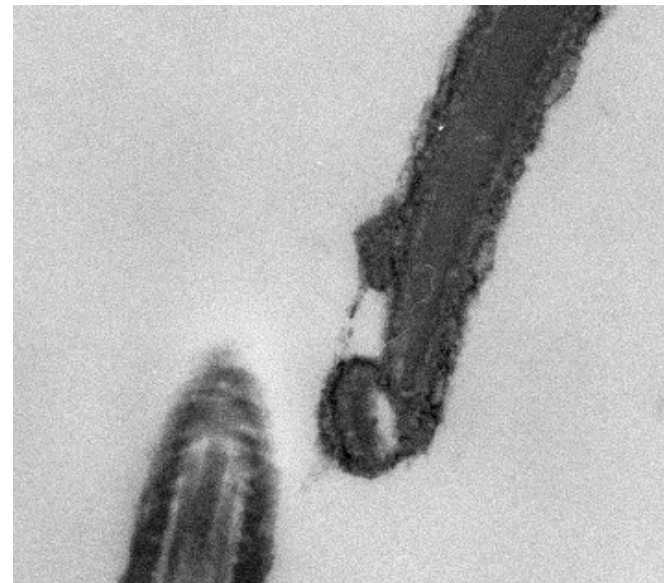


*Chlamydia attached mostly to the head. Occasionally also to the tail.*

*C. abortus*



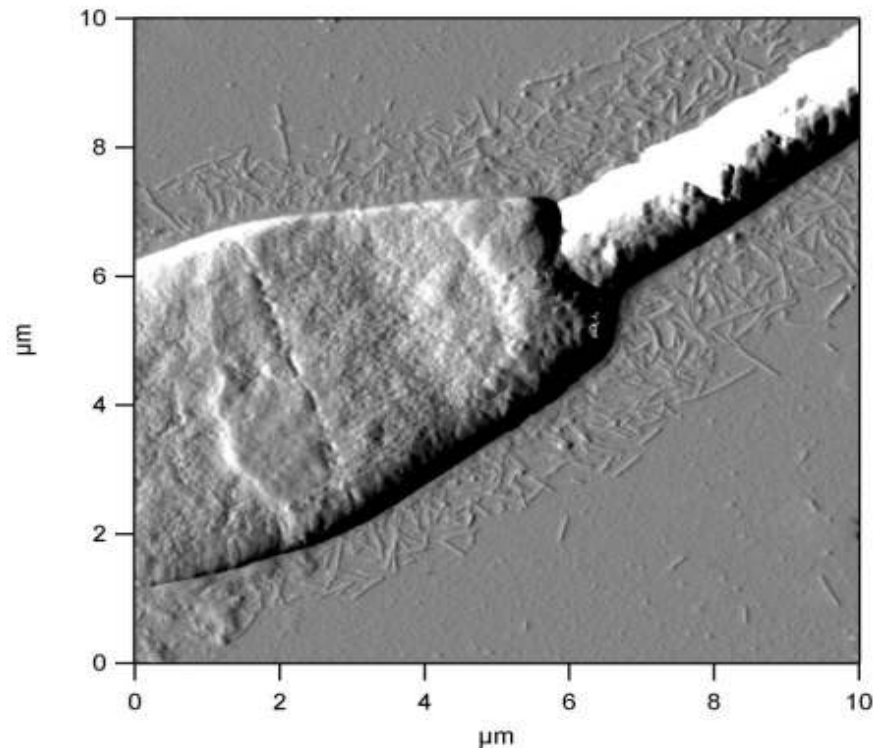
*C. psittaci*



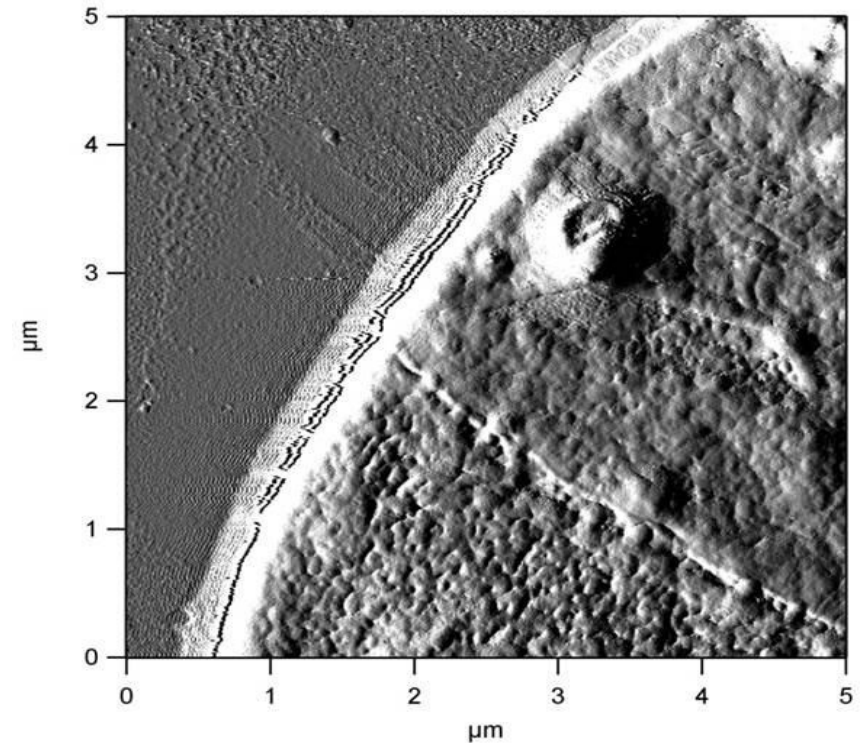
**TEM**

# *Chlamydia can invade the sperm through the cell membrane.*

*Control*



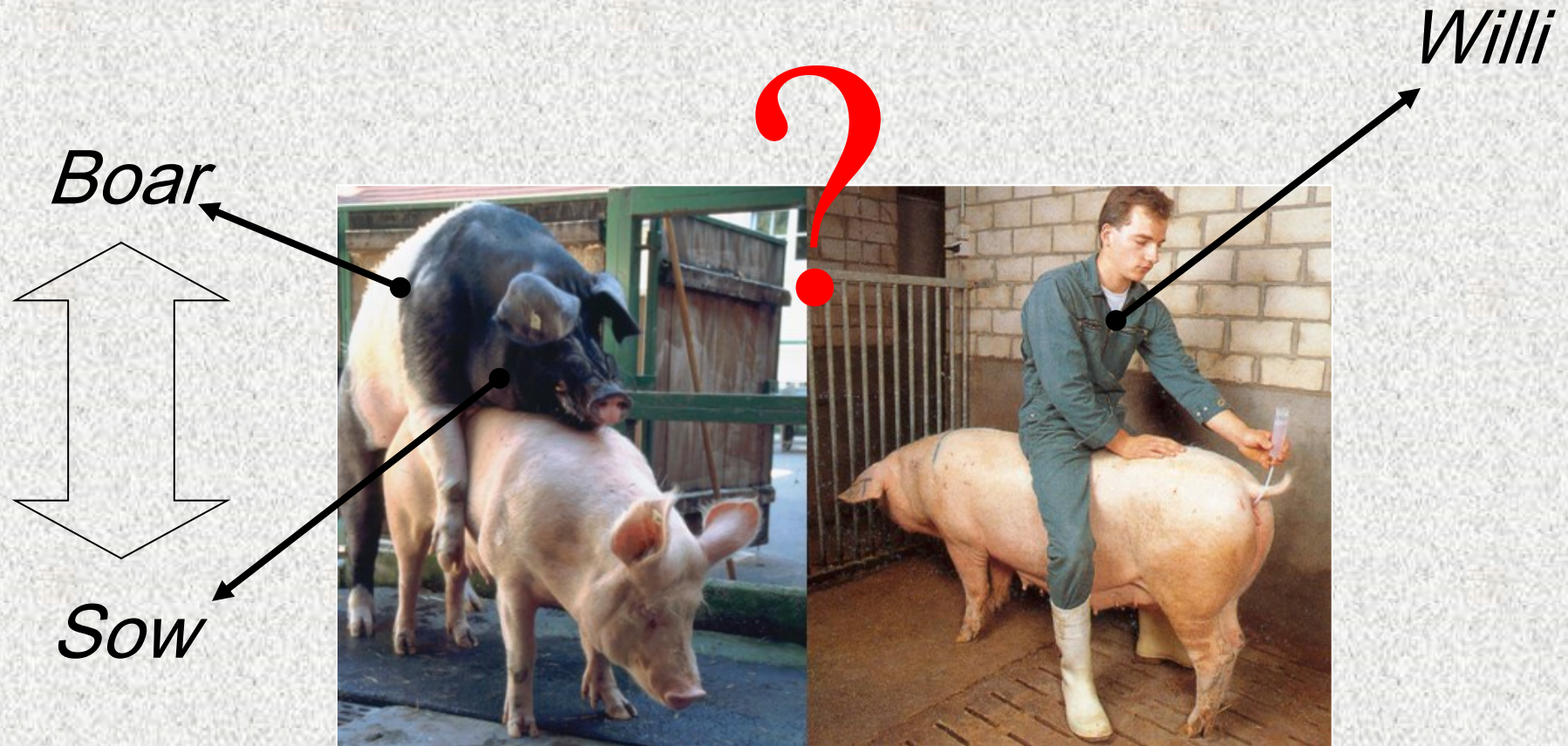
*C. psittaci*



*Atomic Force*



# Hitchhiker?





# Semen transmitted bacteria

- Fall/Winter:

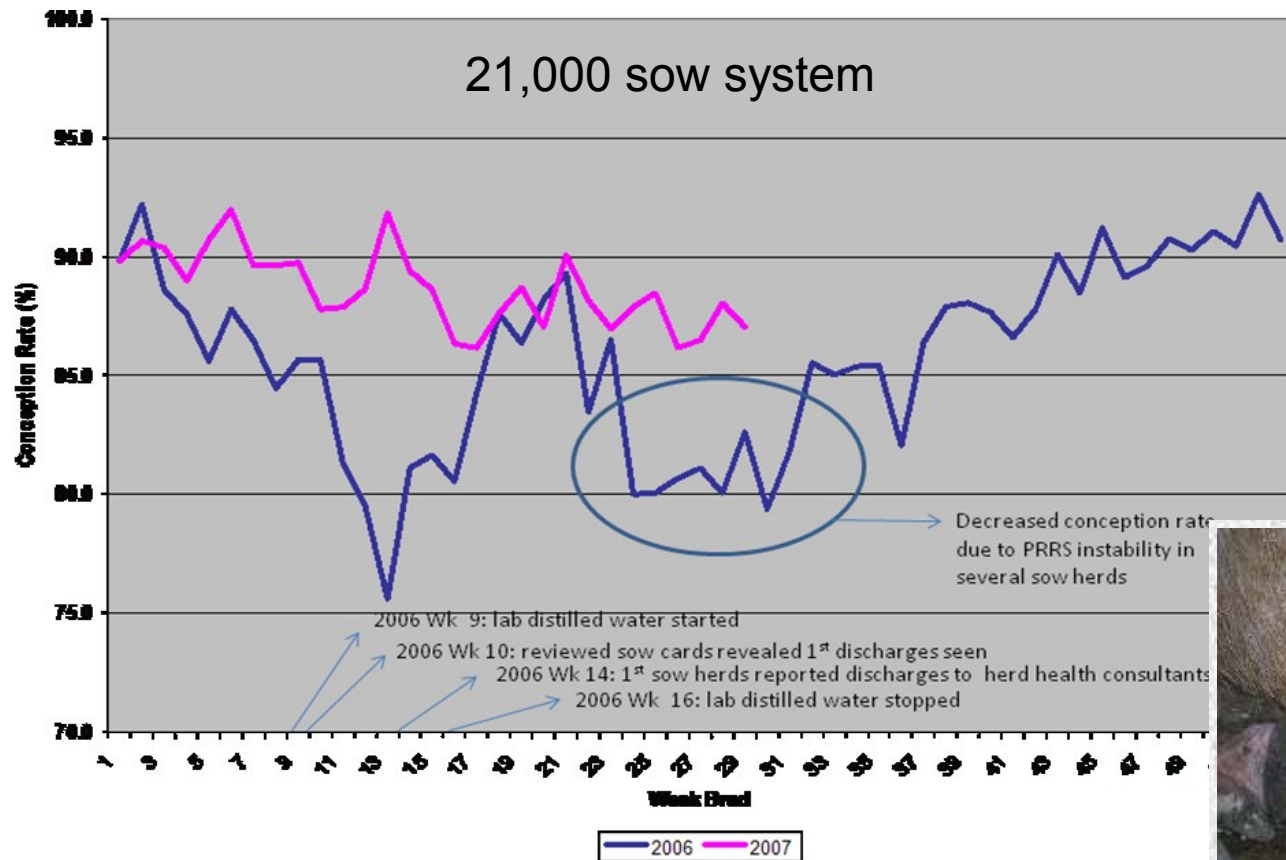
- ⇒ *Acinetobacter* spp.
- ⇒ *Ralstonia pickettii*
- ⇒ *Serratia marcescens*

- Spring/Summer:

- ⇒ *Enterobacter* spp.
- ⇒ *Enterococcus* spp.
- ⇒ *Pseudomonas aeruginosa*
- ⇒ *Steno. maltophilia*

No seasonal preference:

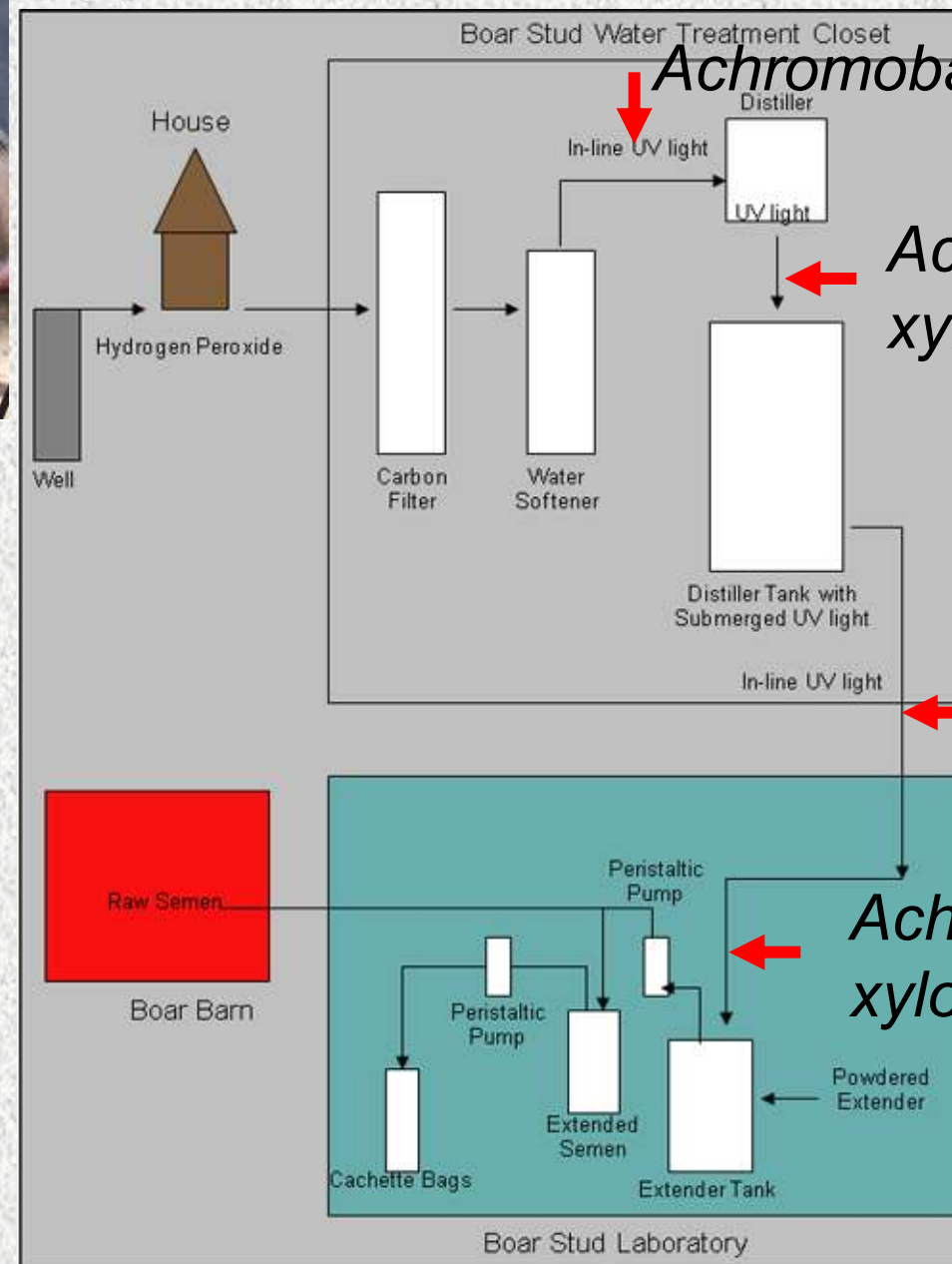
*Achromobacter xylosoxidans*, *Coagulase-negative Staphylococcus* spp., *Corynebacterium* sp., *Klebsiella oxytoca*



- 8 – 15 % of sows with vaginal discharge  
3 – 19 Tage *post inseminationem*
- Endometritis
- Micro (swabs, post mortem): *Achromobacter xylosoxidans*



Boar stud – 180 boars



*Achromobacter xylosoxidans*

*Achromobacter xylosoxidans*

*Achromobacter xylosoxidans*

*Achromobacter xylosoxidans*



# Mycotoxins

## Deoxynivalenol (DON)



DON in bile/straw  
(ng/ml or mg)

ID 008	96.4
ID 1069	98.2
ID 1535	100
ID 1095	5.4

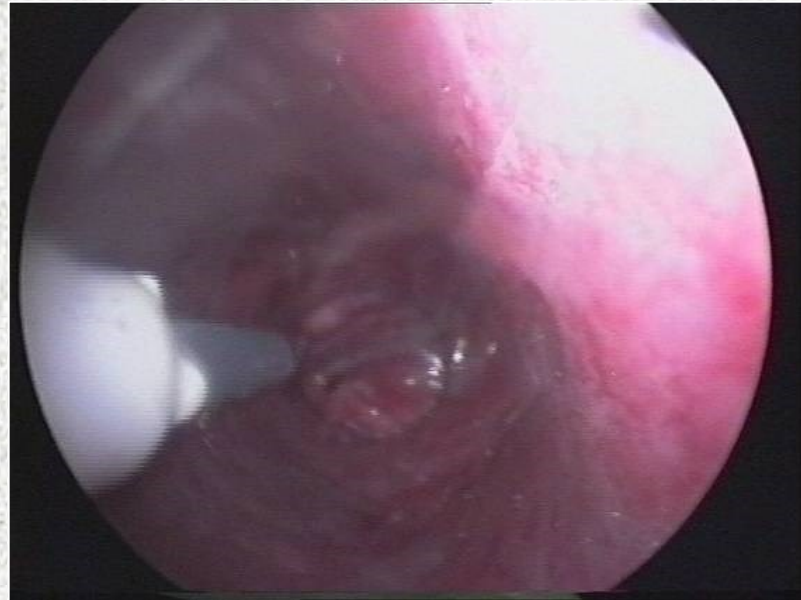
Straw	3.93
-------	------

New S	100
-------	-----

- 50 % CR
- Vaginal discharge/endometritis
- DON in bile →
- DON in straw →
- DON in new straw →
- 75 % CR

# Some words on Microbiology

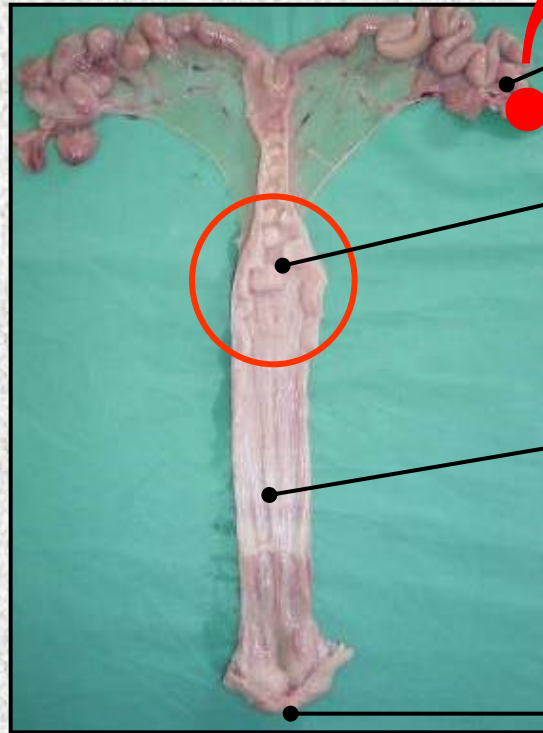
## “The way of swabbing”





# Some words on Microbiology

## “The place of swabbing”



Slight amounts:

*E. coli*

High amounts:

*Enterococcus sp.*

Slight amounts:

*Staphylococcus aureus*

Moderate amounts:

*Enterococcus sp.*

Slight amounts:

*Sc. dysagalactiae ssp equisimilis*

High amounts:

*Staphylococcus aureus*

*E.coli*

*Enterococcus sp.*

*Sc. dysagalactiae ssp equisimilis*



# Some words on Microbiology

## “Interpretation of the results”

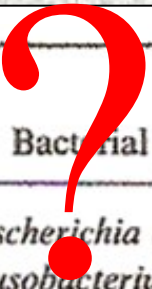


### Example results from bacterial swabs (n = 89)

Gram-positive	Gram-negative	Fungi
<i>Staphylococcus aureus</i>	<i>Escherichia coli</i>	<i>Mucor</i>
<i>Arcanobacterium pyogenes</i>	<i>Acholeplasma hydrophila</i>	<i>Aspergillus</i>
<i>Streptococcus dysgalactiae</i> spp. <i>equisimilis</i>	<i>Pseudomonas aeruginosa</i>	
Coagulase-negative <i>Staphylococcus</i> spp.	<i>Aeromonas</i> spp.	
<i>Staphylococcus saprophyticus</i>	<i>Klebsiella</i> spp.	
<i>Staphylococcus intermedius</i>	<i>Chlamydia</i> spp.	
<i>Bacillus</i> spp.	<i>Proteus</i> spp.	
<i>Enterococcus faecalis</i>		

# Some words on Microbiology

Results of microbiological investigation of vaginal swabs recovered from 16 sows with vaginal/vulval discharge



Herd number	Bacterial growth
P1	<i>Escherichia coli</i>
P1	<i>Fusobacterium necrophorum</i>
P2	<i>Lactobacillus</i> sp.
P2	<i>Peptostreptococcus</i> sp.
P2	<i>Actinobaculum suis</i>
P3	<i>Porphyromonas</i> sp.
P3	<i>Prevotella</i> sp.
P3	<i>Clostridium perfringens</i>
P4	Coliform sp.
N1	<i>Pasteurella</i> sp.
N1	<i>Escherichia coli</i>
N1	<i>Arcanobacterium pyogenes</i>
N1	<i>Peptostreptococcus asacharolyticus</i>
N1	<i>Staphylococcus aureus</i>
N2	Coagulase-negative staphylococci
N3	<i>Escherichia coli</i>

Anaerobic Growth

# Mycotoxins

Aflatoxins

Ochratoxin

Citrinin

DON (Vomitoxin)

Zearalenone

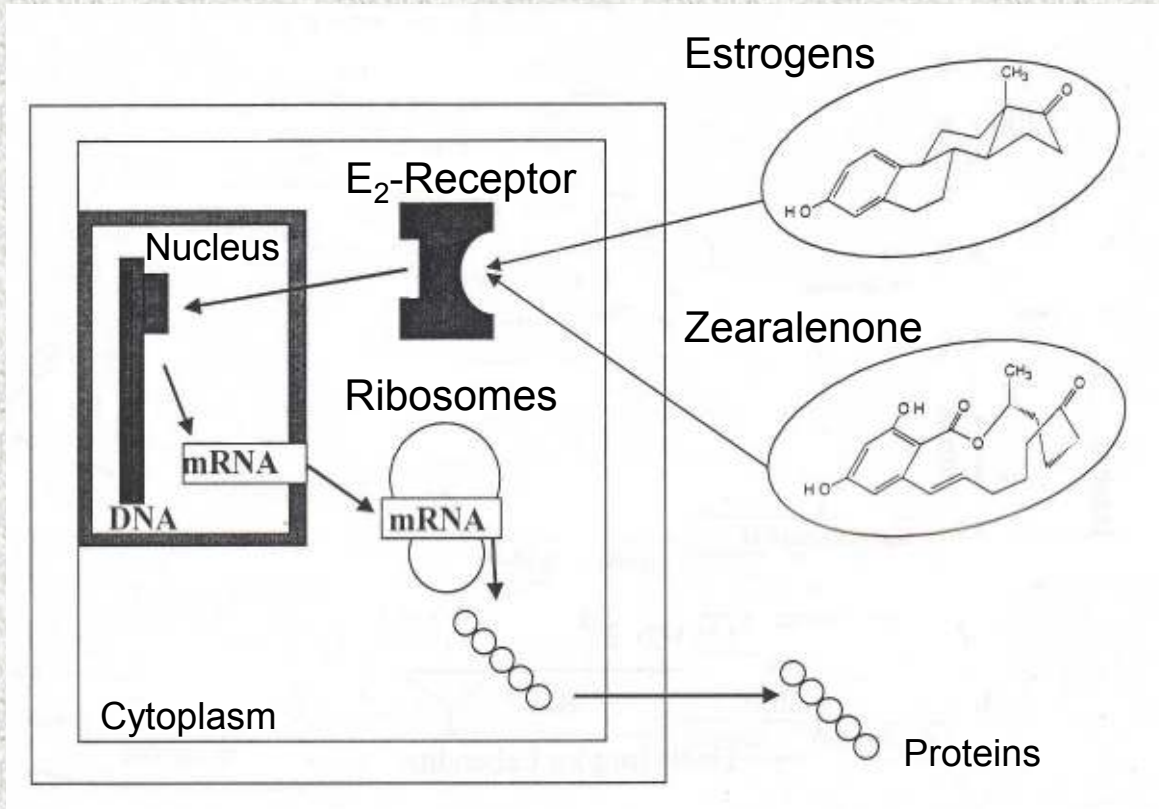
Fumonisin

Ergotoxin

T2



# Zearalenone



- Hyperestrogenism
- Impaired oocyte maturation
- Reduced follicular steroid synthesis
- Impaired embryonic development
- Increased embryonic mortality
- Delayed onset of puberty
- Enlarged uteri & excessive endometrial edema
- Ovarian abnormalities (cysts, persistent CL, inactive ovaries)
- Irregularities of the estrous cycle
- Pseudopregnancy



Penn  
Veterinary Medicine



AUBURN  
UNIVERSITY



Klinikum  
Veterinärmedizin

Did a study where we were fed ZEA  
between day 101 -114 of pregnancy and  
over a 21 day lactation.

**Did not see signs of hyperestrogenism  
either in piglets or sows!!**

# ZEA(like DON) – an every day & sometimes frustrating Challenge!

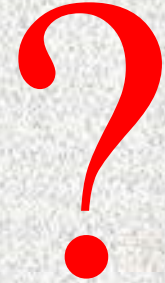
1. Do we know about the effects of exposure?
2. What is the right specimen for analysis? – bile, blood, milk *versus* feed...
3. “Critical” concentration in biological specimens?
4. What methodology (i.e. ELISA *versus* HPLC/MS)?



# Methodology (DON)

Results of Analysis of different Substrates for DON and metabolites (DOM) (after Poweleit, 2008)

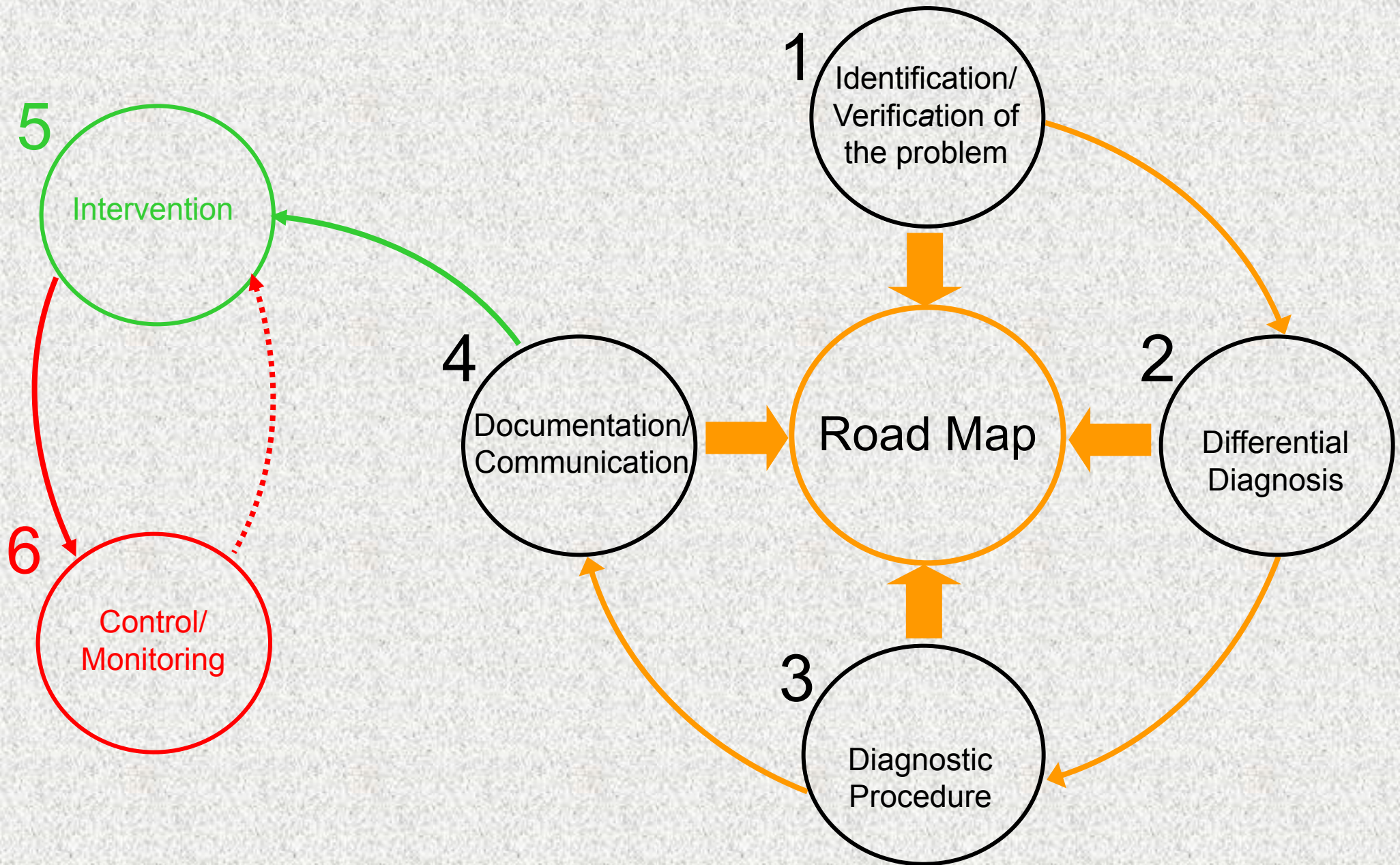
Sample ID	Sample Type	Lab		
		A	B	C
		DON	DON/DOM	DON/DOM
1	Milk Sow 1	75 µg/l	<0.5/<0,5 µg/l	
2	Milk Sow 2	103	<0.5/<0,5	
3	Milk Sow 3	120	<0,5/<0,5	
4	Serum Sow 1	117.5 µg/l	<2/<2 µg/l	<1.5/1.2 µg/l
5	Serum Sow 2	22.5	<2/<2	<1.5/1.2
6	Serum Sow 3	48.8	<2/<2	<1.5/1.2
7	Serum Piglet 1	69.5	<2/<2	<1.5/1.2
8	Serum Piglet 2	73	<2/<2	<1,5/1.2
9	Serum Piglet 3	105	<2/<2	<1.5/1.2
10	Lac feed	< 134 µg/kg	77	



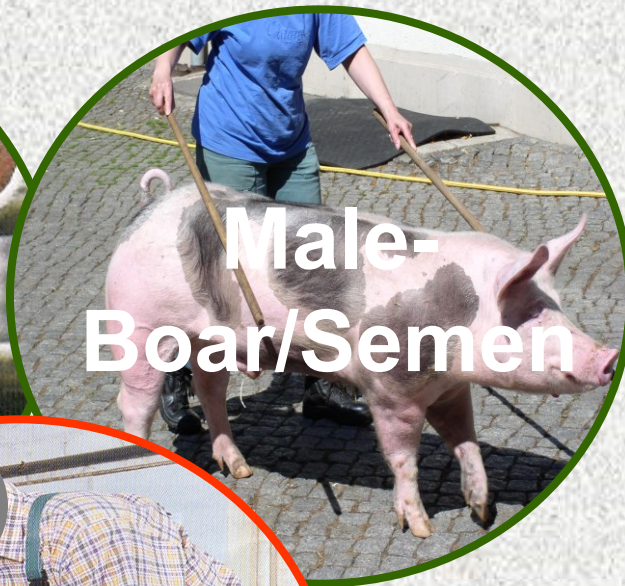
Lab A:ELISA

Labs B & C: HPLC/MS

# „Road Map“ for Troubleshooting



# Triangle of Reasons for Reproductive Failure





# Differential Diagnosis

## ➤ Low Conception Rate

### ■ Sow

- Ovulation failure?
- Endometritis?
- Mykotoxins?
- PRRS, PCV2, PPV
- Body condition?
- etc

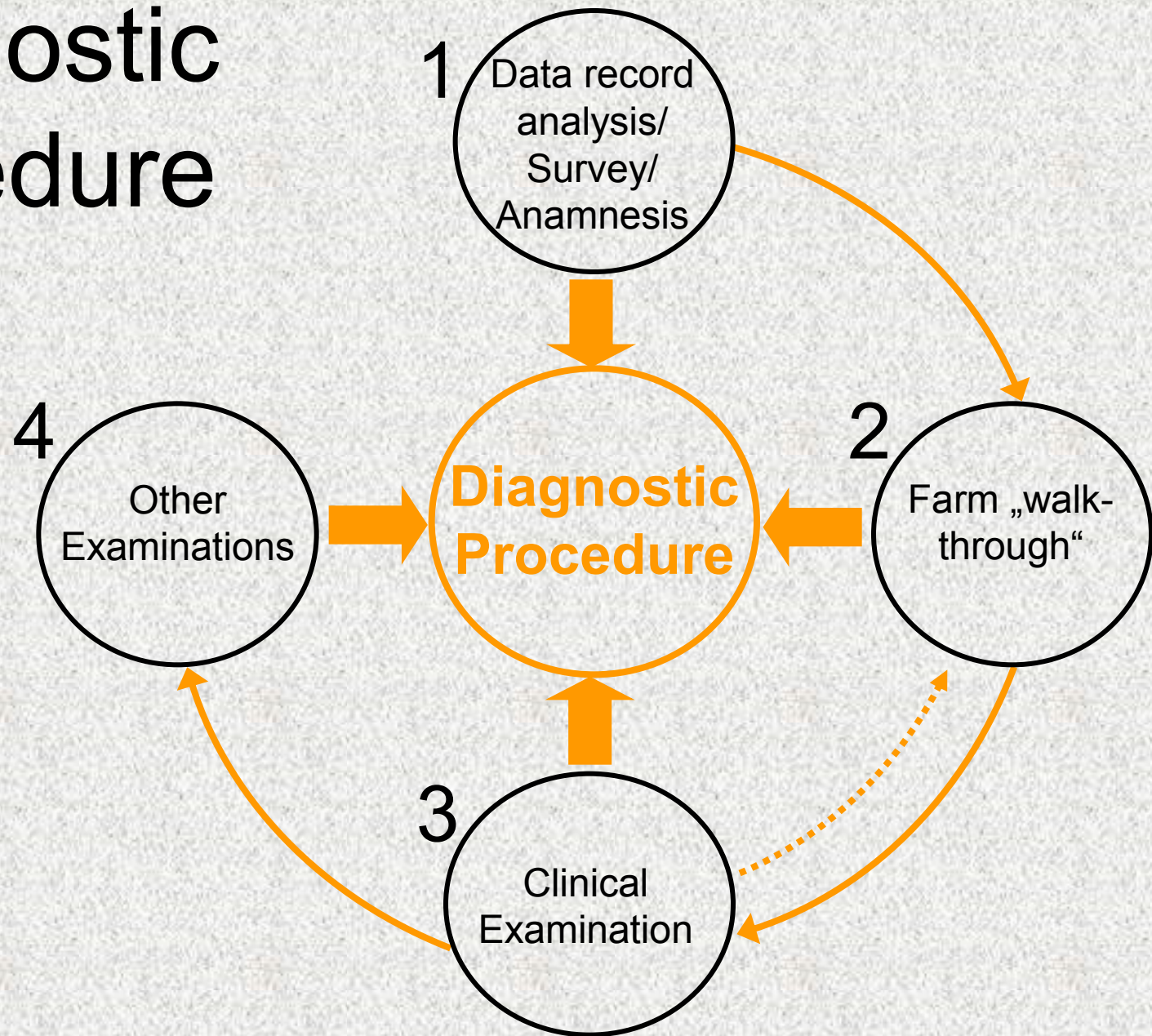
### ■ Boar

- Semen Quality?
- Semen Storage?

### ■ Personnel/Management

- Insemination?
- Stress?
- Pregnancy Diagnosis?

# Diagnostic Procedure



# Data record analysis just important!!





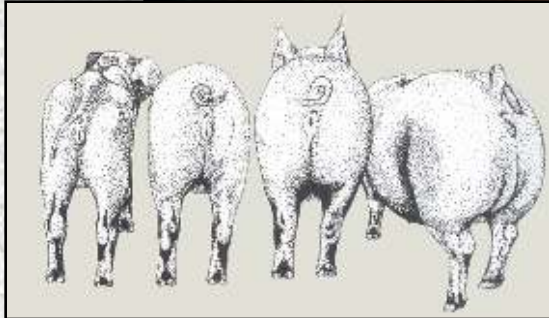


**Clinical  
Examination**





# Adspection – Discharge/Abortion/Mammary Gland/Body Condition



# Inspection





# Ultrasonography



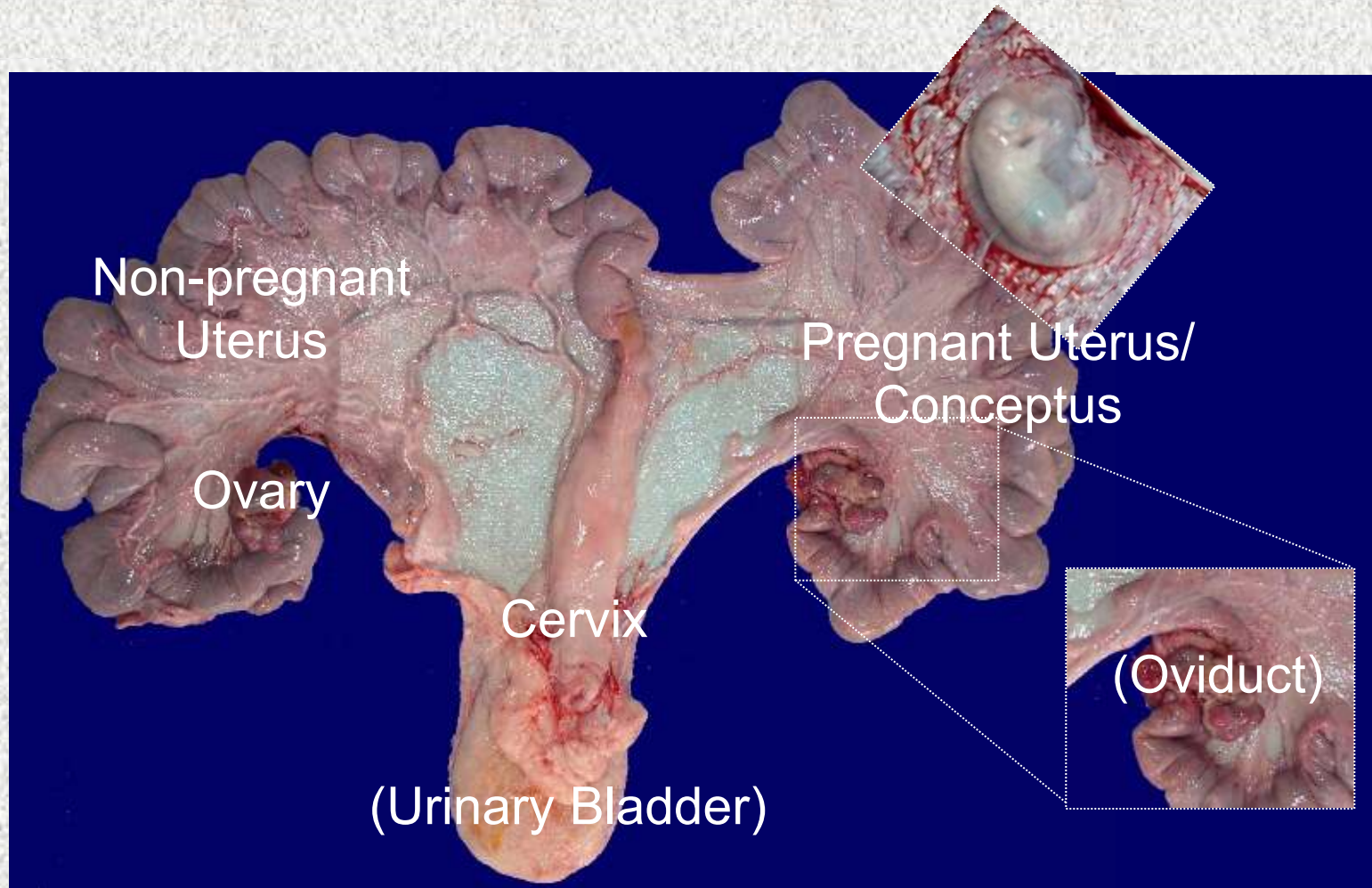
# Ultrasonography



Has made the pig transparent.

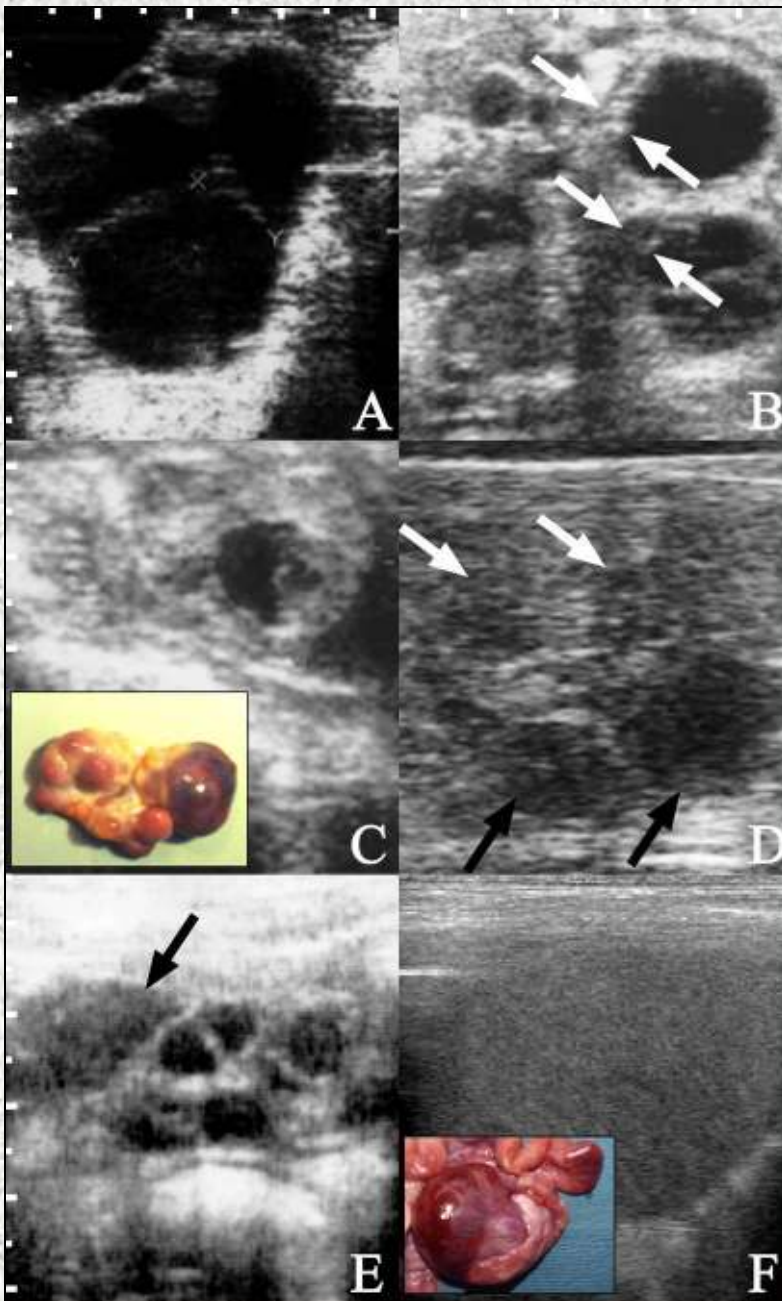


# The Female Reproductive Tract





# Ovaries



A – Polycystic ovarian degeneration (thin wall, follicular)

B – Polycystic ovarian degeneration (thick wall, luteal)

C – Blood cyst

D – Oligocystic ovarian degeneration (two cysts & CL)

E – Paraovarian cyst

F – Intraabdominal testicle-resembling structure in a gilt

# Non-gravid (non-puerperal) Uterus

## *Parameters to be recorded*

Fluid echogenicity (“Content”)

Echotexture

Size

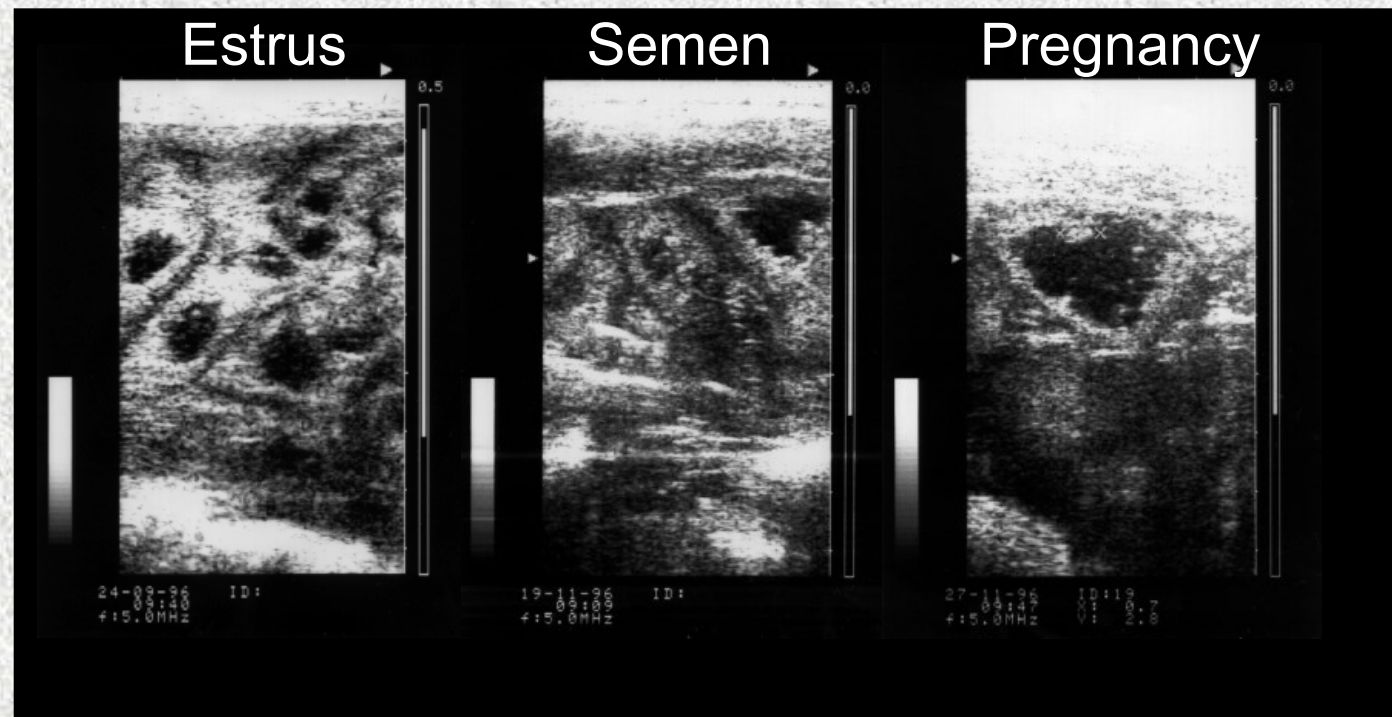
# *Fluid echogenicity*

## Abnormal unless

### Pregnancy

### Estrus

### Semen



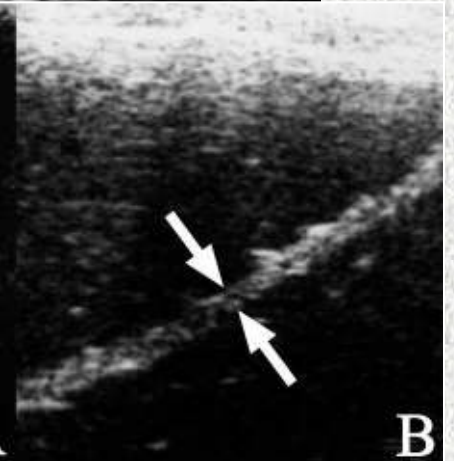
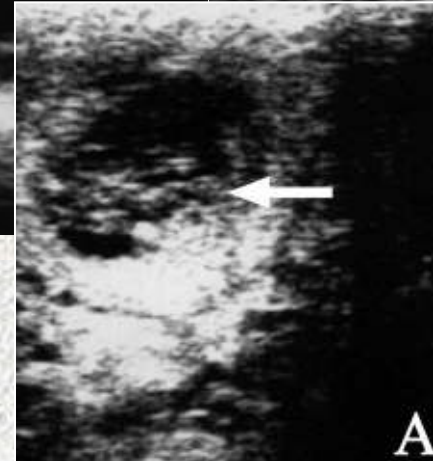
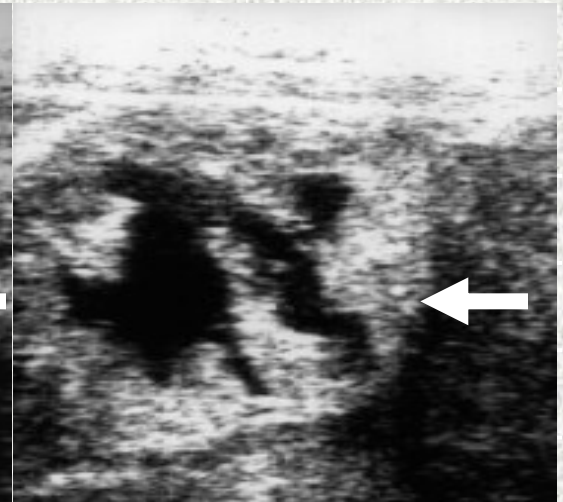
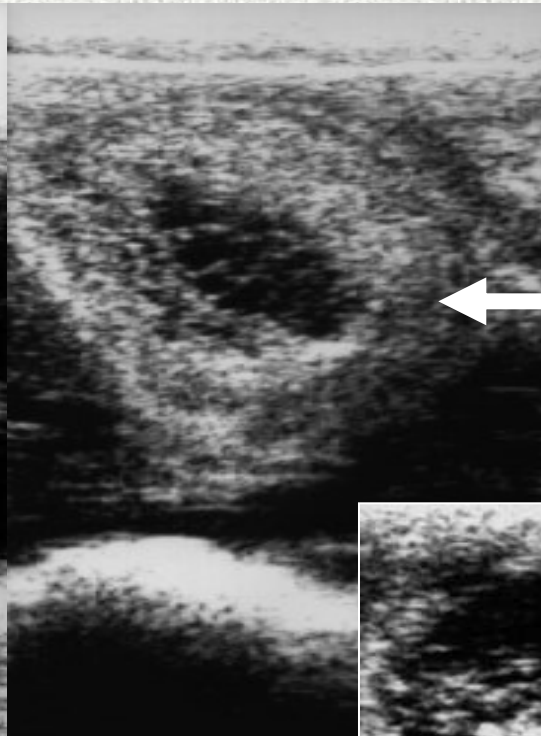
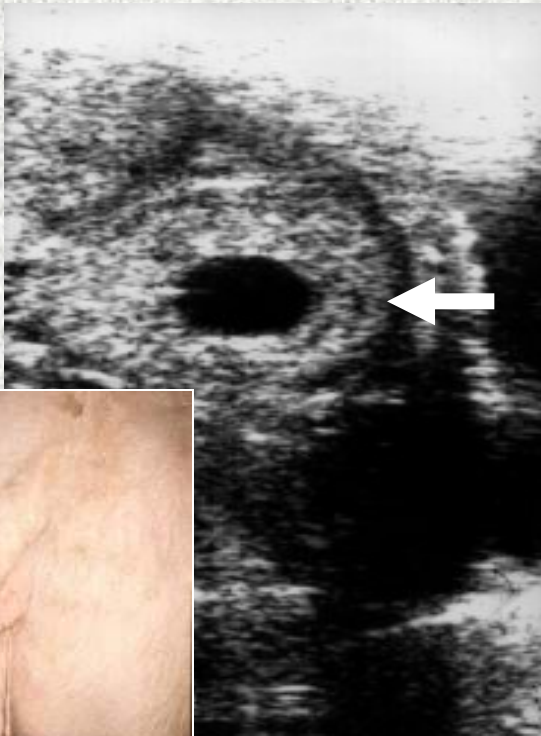


# Abnormal Fluid Echogenicity

Abortion Day 21

Day 21

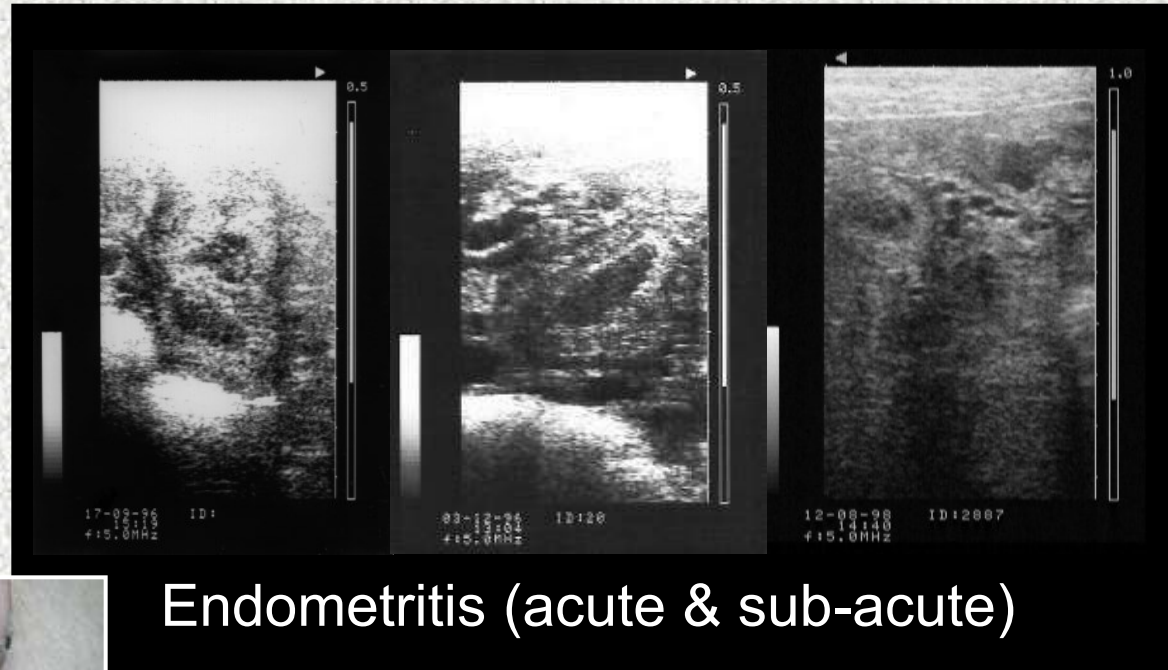
Day 28



Embryo in  
decomposition

Hydrometra

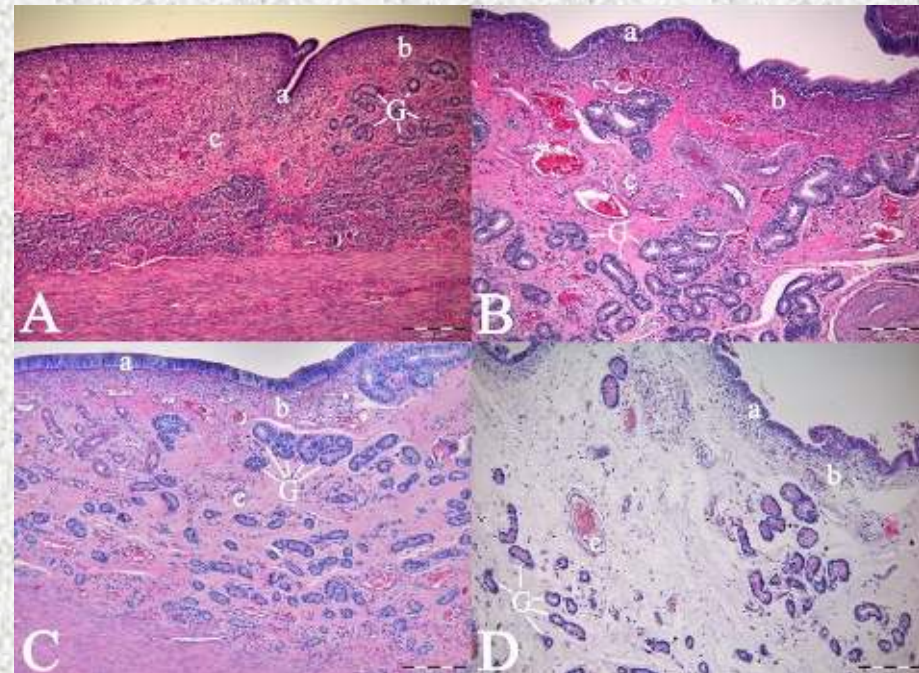
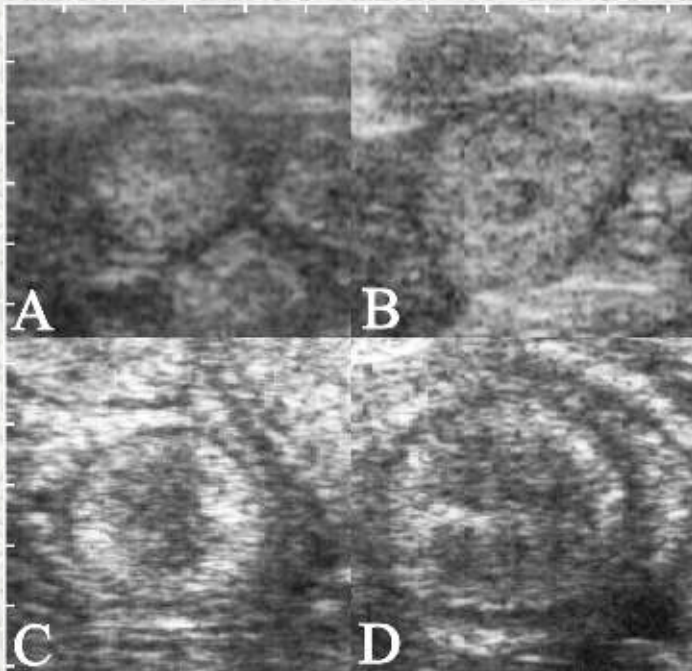
# Abnormal Fluid Echogenicity





# Echotexture

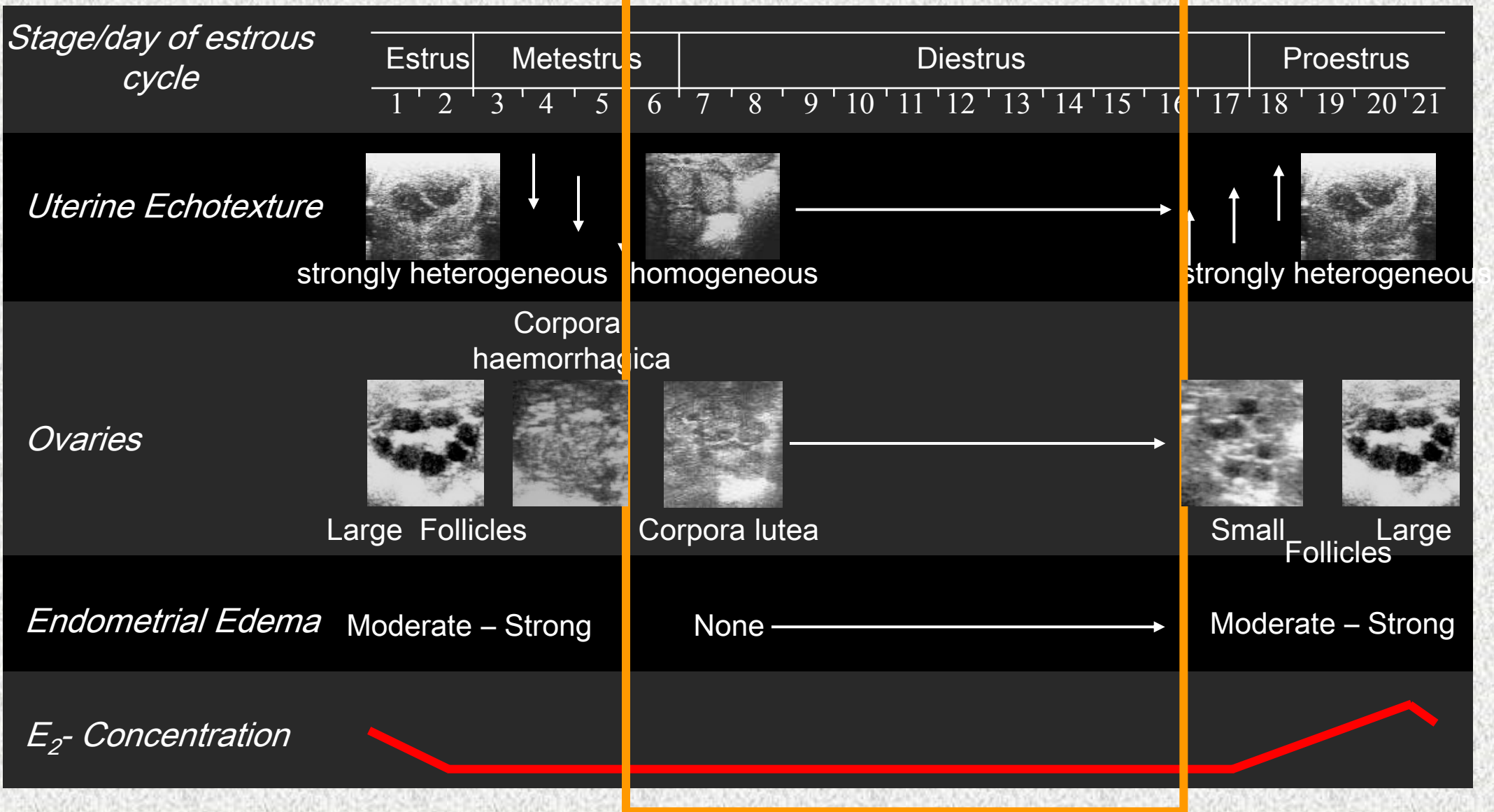
Sows/gilts with reproductive failure (n = 47)  
Ultrasonography and histology of the uterus



Echotexture	
Endometrial edema	$r = 0.57$ ( $P < 0.001$ )



# Echotexture



# Echotexture

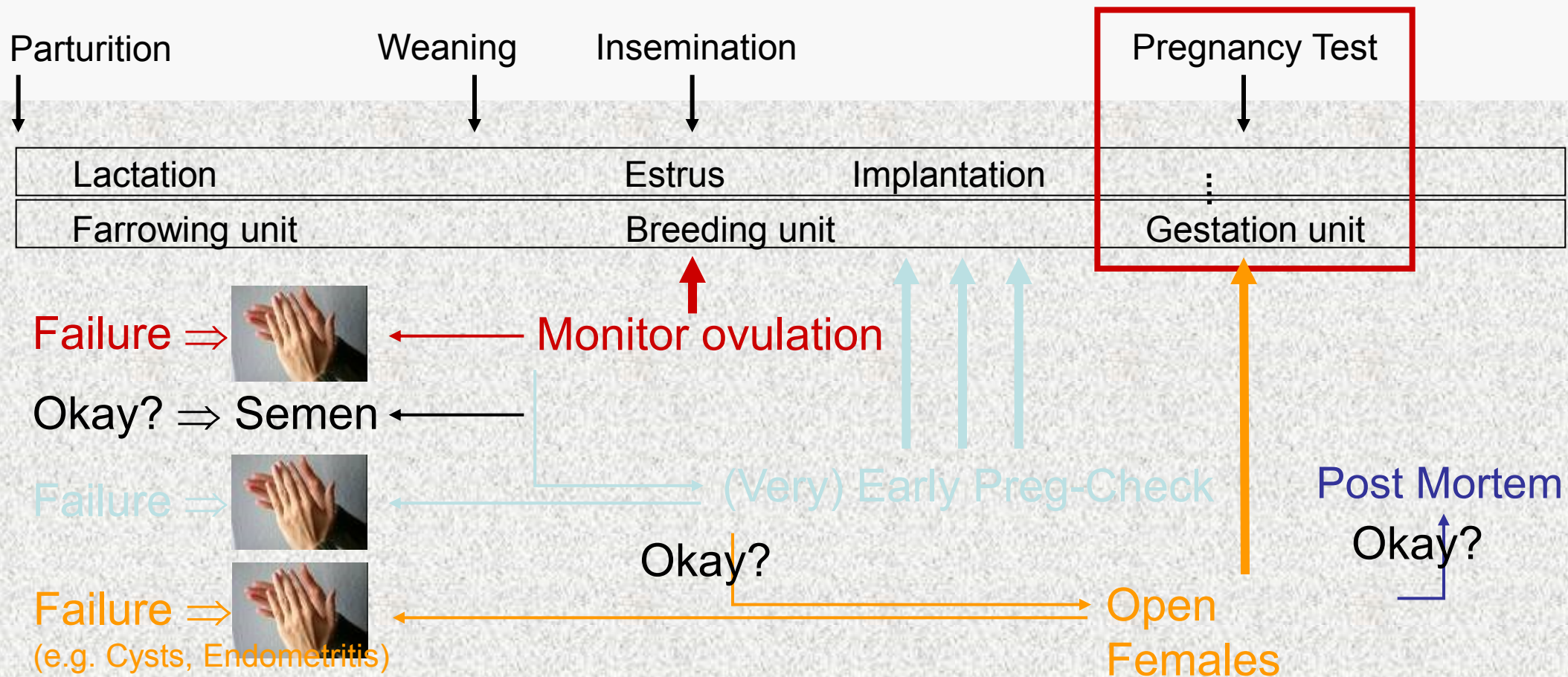
“A specific uterine echotexture requires a specific ovarian configuration (e.g. CL, Follicles) and *vice versa*. Any discrepancy is considered abnormal.”

# What is the Echotexture good for?

- The more heterogeneous, the less fertile
- CI & heterogeneous echotexture = pseudopregnancy



# Low Conception Rate



# Somewhere in the US

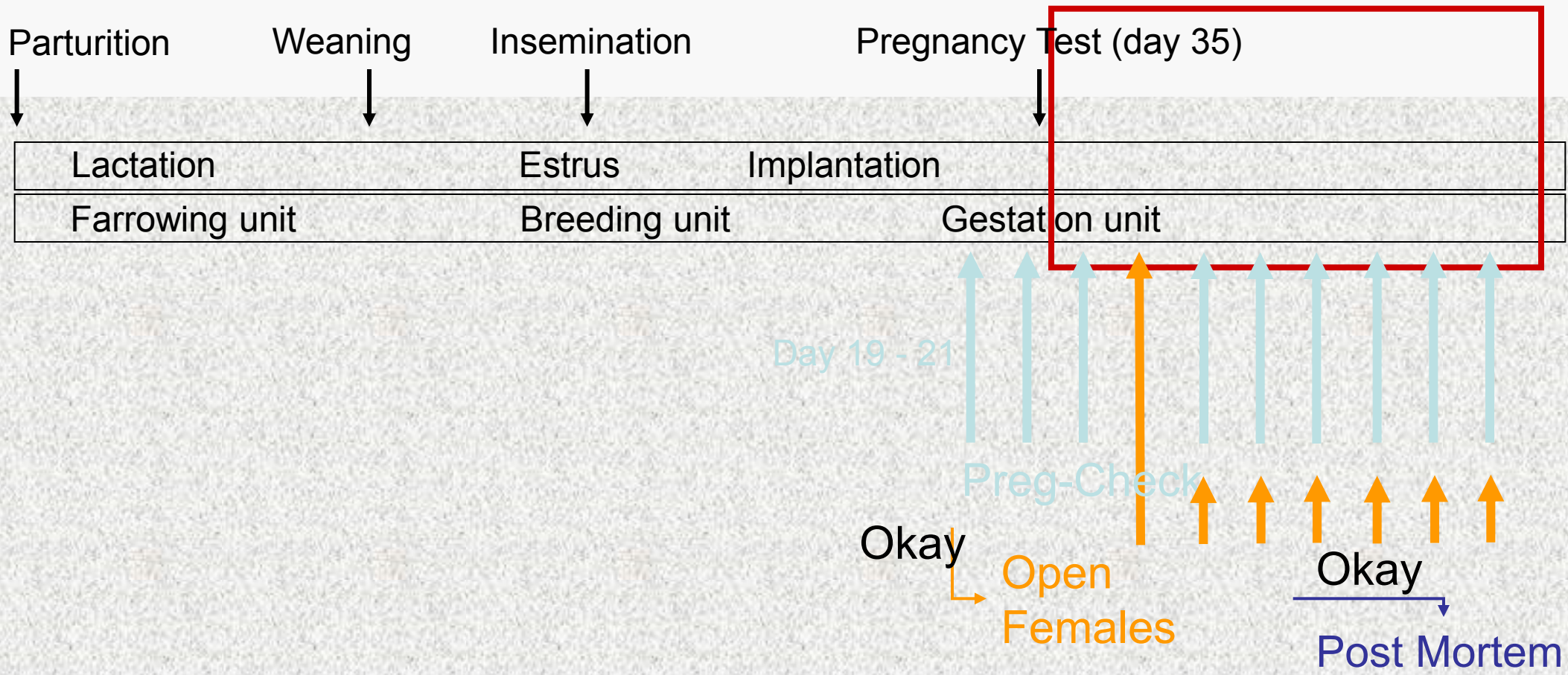
“... sow farms have experienced late-term fallout defined as a sow that has preg-checked positive at 35 days via real-time ultrasound and then fails to farrow. These sows are not recognized as showing signs of estrus in the farm. They are noticed during a visual check around 75-80 days of gestation as not having outward signs of pregnancy. ... The percent fall-out post preg check will vary, but typically will be 10-15 %... whereas it is 5-9% in other operations with similar management...”

# Late Fallout – Diagnostic Procedure

- Comprehensive Record(ing) Analysis
- Serology
- Bacteriology
- Water & Feed Analysis
- Ultrasonography
- Post mortem of Organs of the Urogenital Tract
- Analysis for Mycotoxins (Bile)



# Late Fallout – Diagnostic Procedure



# Results

- Comprehensive Record(ing) Analysis  
⇒ Data Entry erroneous
  - Serology
  - Bacteriology
  - Water & Feed Analysis
- } Negative/  
Inconclusive

# Results

- Ultrasonography  $\Rightarrow$  No Fallouts!!
  - Post mortem of Organs of the Urogenital Tract
  - Analysis for Mycotoxins (Bile)
- } Negative/  
Inconclusive



# Late Fallout – Diagnostic Procedure

- Scanned 2 Groups with app. 230  
Gilts/Sows pregnancy day 35 & 42  
(after farm preg-check has been done)
- 8–12 % incorrect diagnoses  
(positive/negative)



# Late Fallout – Value

## ➤ Savings

- Reduced open days
- Reduced diagnostics

## ➤ Improvements

- Mental (except the heat checking person)
- Data entry
- Heat checking procedures
- PD procedures (purchase of u/s machines)



# Take Home Message

- Management!
- „Think easy first“.
- Road Map! Helps to avoid useless Diagnostics & saves Money & Time.

# Take Home Message

1. As for reproduction there is always room for improvement – necessity to know about repro and the way to examine pigs.
2. Multitude of reasons (also at the organ level)
3. Still several unknown issues. More or less crucial.
4. However....Management, Management, Management...!!!

Many Thanks for Attention!



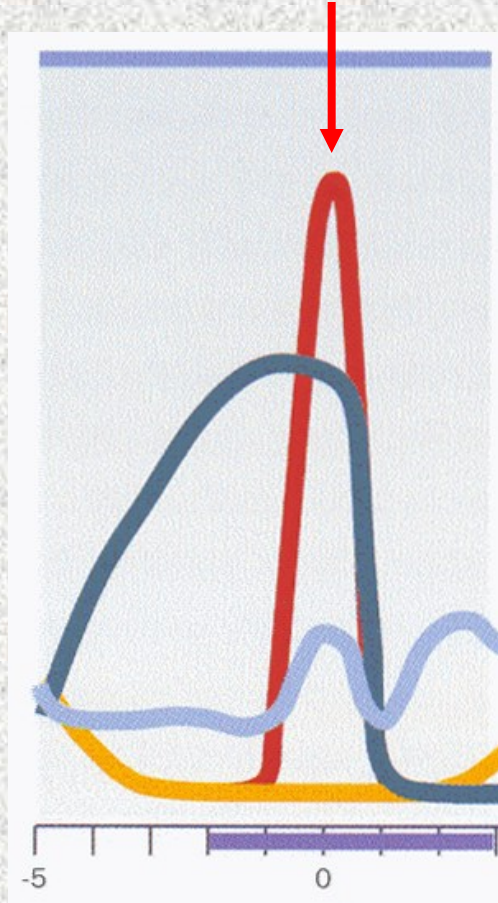


# Oviduct - Infectious

- Did not see a correlation between histopathology and Chlamydia-positivity
- Did find Chlamydophila (Cp.) psittaci (n = 18), Chlamydia (C.) suis (n = 10), C. trachomatis (n = 3) and Cp. abortus (n = 2)

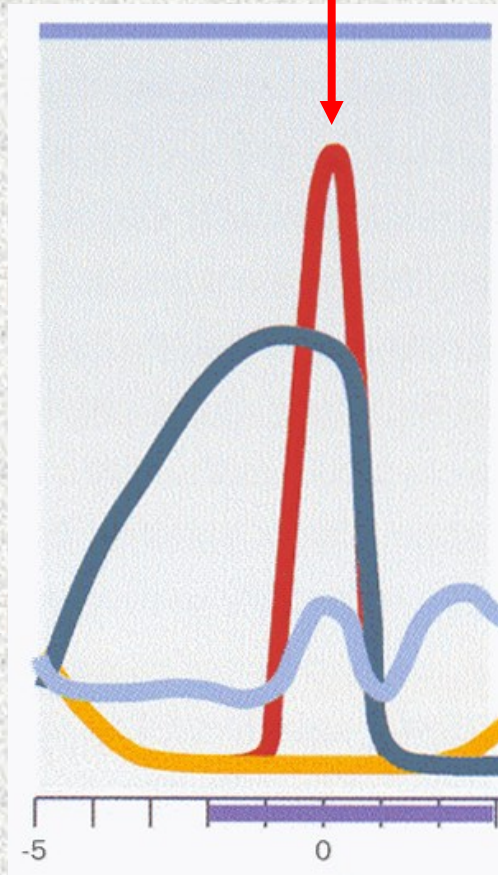
# Cystic Ovaries - Pathogenesis

*GnRH*



# Cystic Ovaries - Pathogenesis

*GnRH*



*Single cysts/ Oligo-cystic  
ovarian degeneration*

*As the result of  
? (Single follicles with  
insufficient LH-receptors?)*



# Uterine Inflammation - Nomenclature

- Puerperal *versus* Non-puerperal
- Clinical *versus* Non-clinical
- Severity (mild/slight/moderate/ etc.)
- Clinical course (chronic, acut/sub-acut)

# Inflammation of the Uterus

## **Clinical course**

Depends on type of inflammation – either no (except for returns) or discharge; seldom also off feed and fever

# Treatment of uterine Infection

Not at all?

Antibiotically *versus* Antiseptically?

Locally?

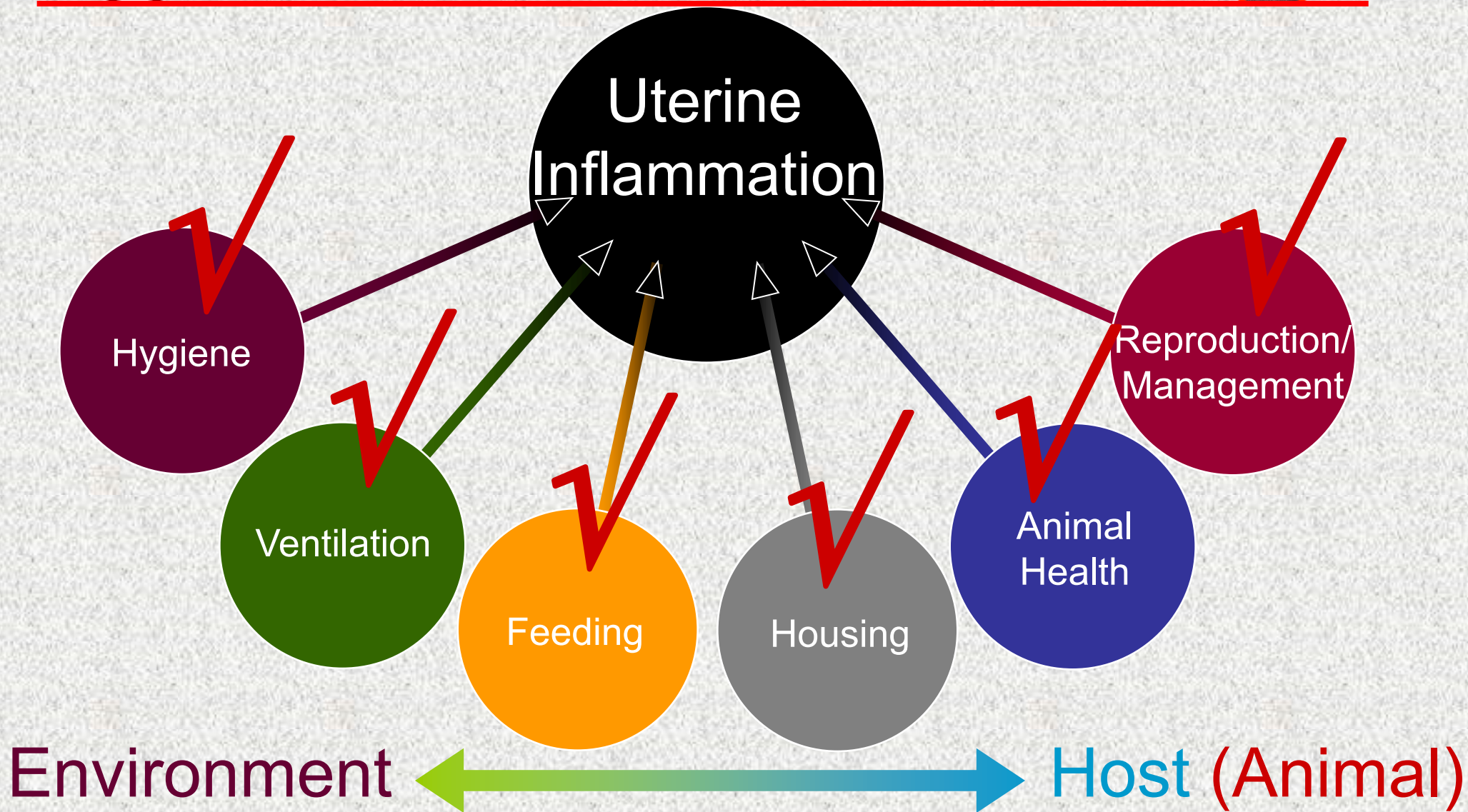
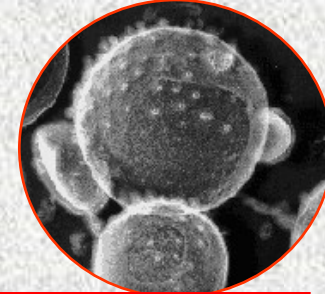
Systemically?

Both?

Ozon?

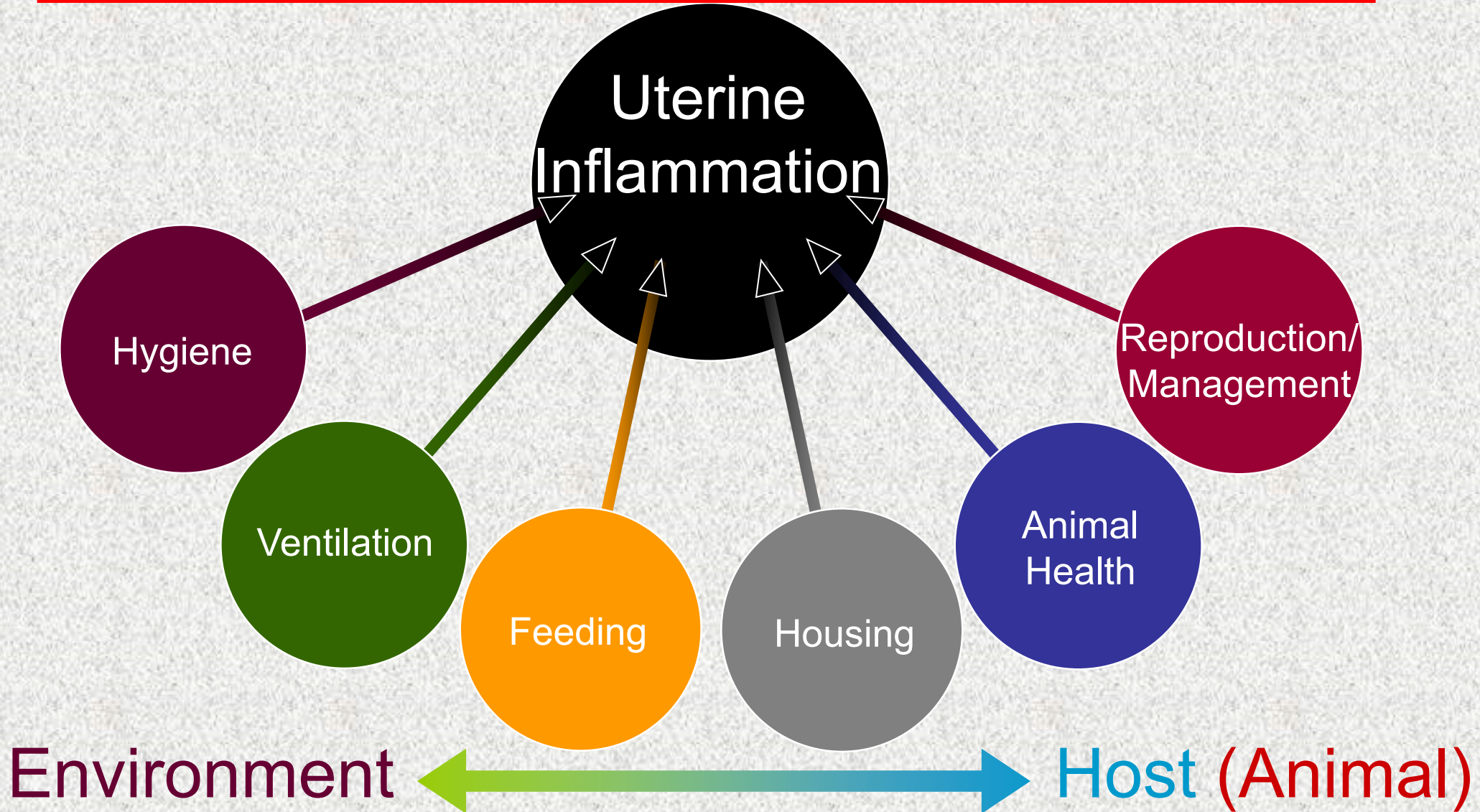
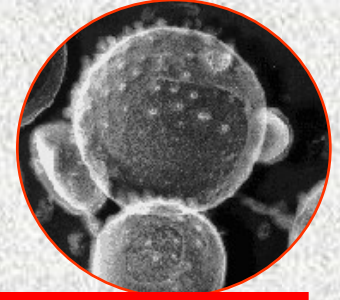






# Cervix/Vagina – Congenital & Miscellaneous

- Persistent hymen
- Injuries as the result of birth problems
- ??





1. As for biological substrates,  
we currently do not have  
values that unambiguously tell  
us a critical exposure!

2. Also, be careful with clinic &  
post mortem, as the picture can  
be extremely variable!

# Things to Consider

1. Would need validated tests for each single specimen!



(Bild: <http://www.boersennotizbuch.de/wp-content/uploads/im/frequent/wuerfeln.jpg>)

2. If there is a choice always ask for HPLC/MS.

3. Remember that not every substrate is appropriate!

# Sow Herd Level:

Common Problems (related to production parameters)

Low Conception/Farrowing Rate

Late Fallout

Low Litter Size

Delayed/No Puberty Attainment

Vulval Discharge

Long Wean-Estrus-Interval

Regular/Irregular Return to Estrus

Embryonic Mortality/Abortion

MMA



# Cystic Ovaries - Therapy

***Cech & Dolezel, 2007:*** Treatment with twice a GnRH analogue in a 12-hrs-interval - cure rate of 84 %

***Kauffold et al.:*** 15.000 IE hCG – 50% cure rate (n = 24); PR 50 %

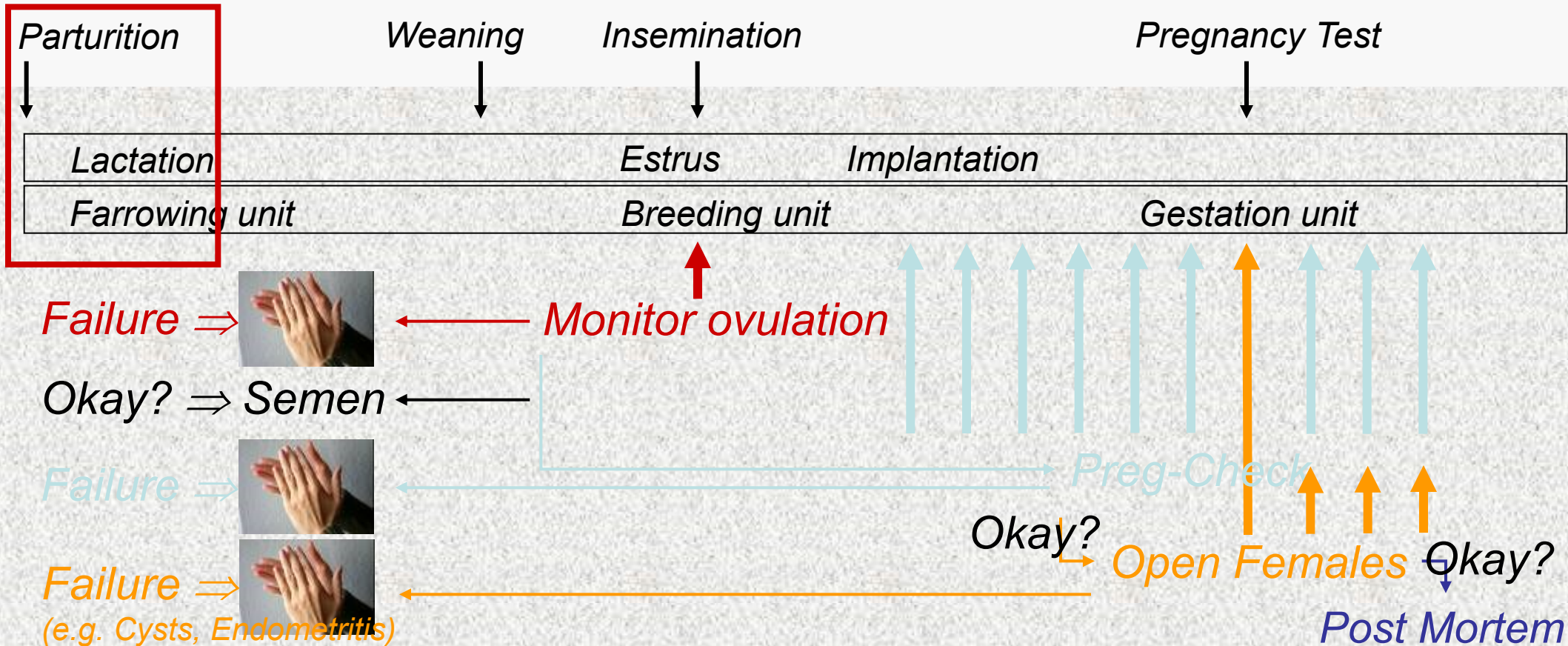
***Kauffold et al.:*** Regumate 18 days – cure rate 100 % (n = 8); PR 100 %

***Kauffold et al.:*** Slaughter – 100 % cure rate (some problems with pregnancy though)

# Repro Exam in the Pig – „Bottlenecks“

1. Pigs can't be really restrained.
2. The manual rectal examination of the genital organs is not that easy or impossible (gilts).
3. The cervix can't be easily penetrated.
4. The money value of a pig is low.

# Low Farrowing Rate





# Culling Reasons for Sows

Stalder et al. Sow Longevity. Pig News and Information. 2004;25:53N-74N.

Analyzed removal reasons between 1960 and 2000:

# 1 Reason was Reproductive Failure ranging between 8.8 and 39.2 %

# Differential Diagnosis

## ➤ Returns (regular/irregular)

- Sow
  - Ovulation failure?
  - Endometrits?
  - Mykotoxins?
  - PRRS, PCV2, PPV
  - Body condition?
  - etc
- Boar
  - Semen Quality?
  - Semen Storage?
- Personnel/Management
  - Insemination?
  - Stress?
  - Pregnancy Diagnosis?