Salmonellosi nel suino in Germania/Danimarca: il ruolo dell'Autorità Competente e del veterinario Aziendale nella gestione del focolaio

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LUFA Nord-West, the service laboratory

LUFA Nord-West is the accredited service laboratory of the Lower Saxony Chamber of Agriculture. The range of services includes analysis, evaluation ...

Swine Health Service

Tasks Swine Health Service

LUFA NORD-WEST

Definition:

„Fighting non-notification diseases with farm character “

Examples from the past:

- A.R. Rehabilitation
- Maligne Hyperthermiasyndrome – Rehabilitation
- Development of SPF-Systems
- Monitoring programs breeding

Tasks SHS - now

- Care of breeding companies
- Care of cooperatives
- Care of trade organisations
- Second opinion at farm visits
- Education of farmers, advisors, vets
- Partner to veterinary public health
- Scientific field studies (in cooperation)
- Control of biosecurity

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„Experts in clinical examination of pigs“

Herd health

Biosecurity

Epidemiology

Vaccination

Structures of German pig production

ISPA

Institut für Strukturforschung und Planung in agrarischen Intensivgebieten, Vechta

Zuchtsauenbestände und Zuchtsauenhalter in den deutschen Bundesländern (2003)

Bundesland	Anzahl Zuchtsauen-halter	Anzahl Zuchtsauen	Zuchtsauen in % des deutschen Bestandes
Schleswig-Holstein	1.246	120.831	4,7
Niedersachsen	8.010	668.932	26,0
Nordrhein-Westfalen	8.212	524.194	20,3
Rheinland-Pfalz	753	30.948	1,2
Saarland	80	1.831	0,1
Hessen	2.859	73.426	2,8
Baden-Württemberg	5.394	296.158	11,5
Bayern	11.430	412.873	16,0
Alte Bundesländer	38.962	2.129.848	82,7
Mecklenburg-Vorpommern	359	78.546	3,0
Brandenburg	421	102.724	4,0
Sachsen-Anhalt	381	106.025	4,1
Sachsen	280	90.542	3,5
Thüringen	324	91.258	3,5
Neue Bundesländer	1.891	459.442	17,8
Stadtstaaten insgesamt*	52	334	0,01
Deutschland	39.085	2.589.624	100,0

* Berlin, Bremen, Hamburg

Es liegen Rundungsdifferenzen auf

Mastschweinebestände und Mastschweinehalter in den deutschen Bundesländern (2003)

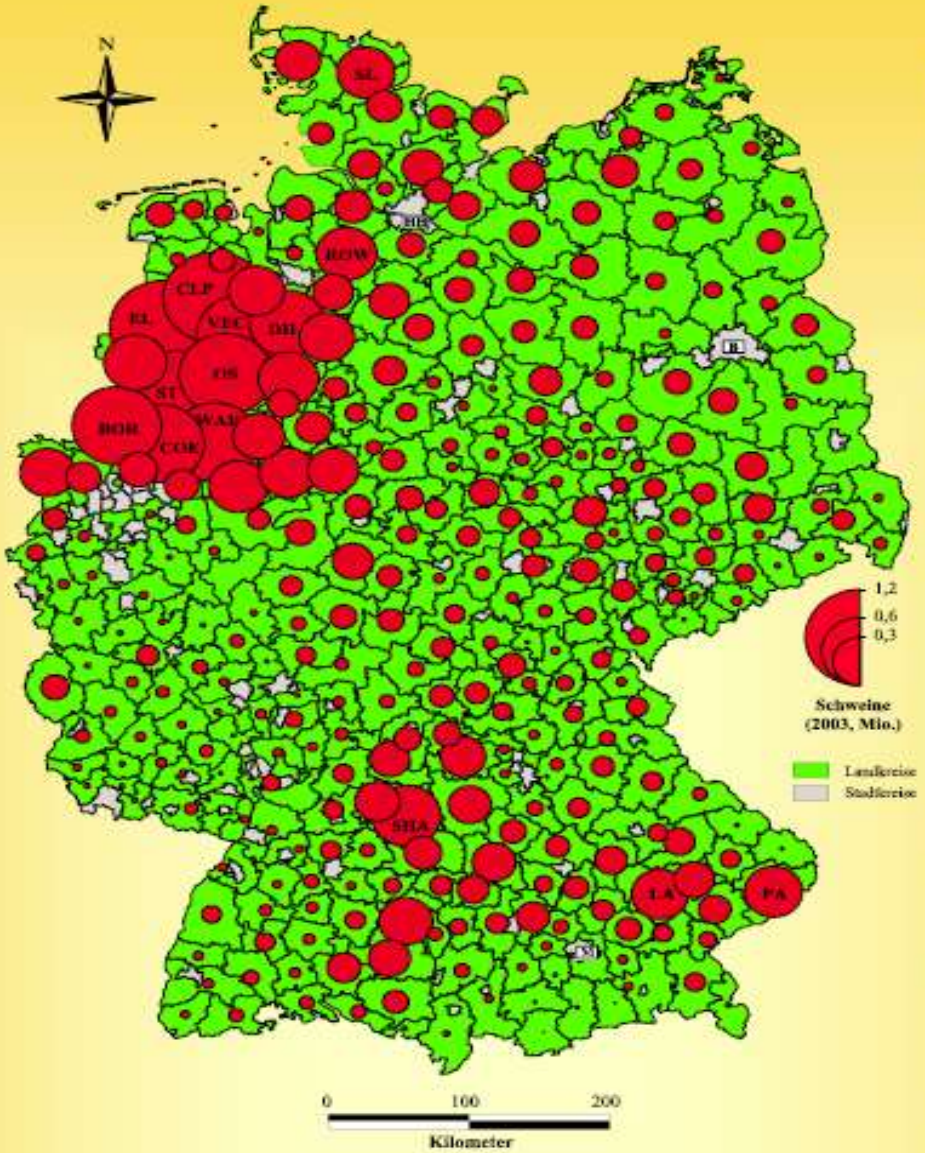
Bundesland	Anzahl der Mastschweine-halter	Anzahl der Mast-schweine in Stück	Mastschweine in % des deutschen Bestandes
Schleswig-Holstein	1.286	574.931	5,5
Niedersachsen	14.273	3.580.578	34,0
Nordrhein-Westfalen	12.685	2.784.319	26,6
Rheinland-Pfalz	1.060	126.400	1,2
Saarland	126	9.549	0,1
Hessen	5.606	360.601	3,5
Baden-Württemberg	11.966	852.419	8,2
Bayern	21.561	1.221.616	11,7
Alte Bundesländer	75.436	9.294.613	88,7
Mecklenburg-Vorpommern	473	246.868	2,4
Brandenburg	660	236.830	2,2
Sachsen-Anhalt	746	280.466	2,7
Thüringen	1.284	225.824	2,1
Sachsen	966	196.000	1,9
Neue Bundesländer	4.191	1.186.488	11,3
Stadtstaaten insgesamt*	27	830	0,01
Deutschland	77.654	10.481.910	100,0

* Berlin, Bremen, Hamburg

Es liegen Rundungsdifferenzen auf

Die 10 führenden Landkreise in Deutschland in der Mastschweinehaltung (2003)

Rang	Landkreis	Bundesland	Anzahl der Mastschweine
1	Cloppenburg	Niedersachsen	530.546
2	Vechta	Niedersachsen	515.334
3	Emsland	Niedersachsen	473.326
4	Weser-Ems	Nordrhein-Westfalen	399.450
5	Coesfeld	Nordrhein-Westfalen	376.536
6	Grafschaft	Niedersachsen	374.818
7	Steinfurt	Nordrhein-Westfalen	351.450
8	Borken	Nordrhein-Westfalen	326.826
9	Oldenburg	Niedersachsen	323.677
10	Ravensburg (Wolfegg)	Baden-Württemberg	300.272
1-10 Landkreise			3.880.835
% 10 Landkreise in % Deutschland			36,8
	Deutschland insgesamt		10.481.910

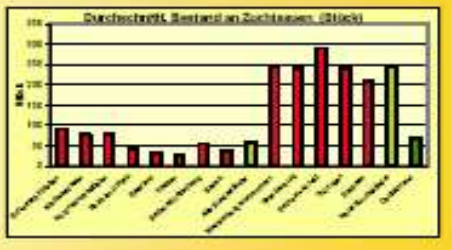


Bruttoeigenerzeugung und Verbrauch von Schweinefleisch in Deutschland sowie Selbstversorgungsgrad (1990-2003)

Jahr	Bruttoeigen-erzeugung	Verbrauch	Selbstversorgungs-grad in %
	in 1.000 t Schlachtgewicht		
1990	4.270	4.864	94
1991	3.738	4.338	86
1992	3.467	4.386	79
1993	3.537	4.564	78
1994	3.476	4.570	77
1995	3.476	4.493	77
1996	3.436	4.493	77
1997	3.506	4.411	79
1998	3.546	4.546	80
1999	3.513	4.523	78
2000	3.551	4.456	80
2001	3.403	4.466	76
2002	3.446	4.456	80
2003	4.356	4.545	96

Herkunftsländer der deutschen Schweinefleisch-importe (2003)

Ausschnitt	Schweinefleischimporte in t
Dänemark	312.636
Niederlande	310.510
Belgien	201.630
Spanien	90.171
Frankreich	47.782
Polen	36.346
EU-15	1.000.590
Drittländer	14.826
Gesamt	1.103.436



Lower Saxony

- Mainly family farms (250 – 2000 sows)
- Very dense areas (Vec, Clp) with a lot of fattening
- Lot of import from Denmark and the Netherlands
- 1/3 of the german swine production
- ½ of the german poultry production

Salmonella

Researchers tackle biofilm to make salmonella infection less aggressive | The Times of Israel

Laws for Salmonella in swine in Germany on farm level

EU

•Regulation (EC) No 2160/2003 of the European Parliament and of the Council of 17 November 2003 on the control of salmonella and other specified food-borne zoonotic agents

↓

Every European Country has to invent a program for monitoring and reduction of salmonella in food producing animals

Germany

Swine Salmonella Regulation (2008)

Regulation to reduce Salmonella in slaughterpigs

Beginning at 50 fattening places

Detection of antibodies at slaughter

Categorisation of farms since march 2008

sampling

• Slaughterpigs / year	samples
More than 200	**60**
101-200	**47**
45-100	**38**
Less than 45	**26**

Q+S Salmonellamonitoring

- **since April 2003**
- **German Databank Qualitype**
- **Categorisation after 1,5-2 years**
- Cat. III since April 2004

Q+S Monitoring

- **Slaugtherpigs / year**

Slaugtherpigs / year	Number of samples
> 400	60
301 - 400	50
201 - 300	40
101 - 200	30
50 - 100	20
< 50	10

Categories in farms

Antibody-level	Category	positive Samples %
• low Status	I	lower than 20%
• Medium Status	II	20-40%
• high Status	III	more than 40%

- „Cut-off“ at 40% (Test cut off is 10%)

Denmark

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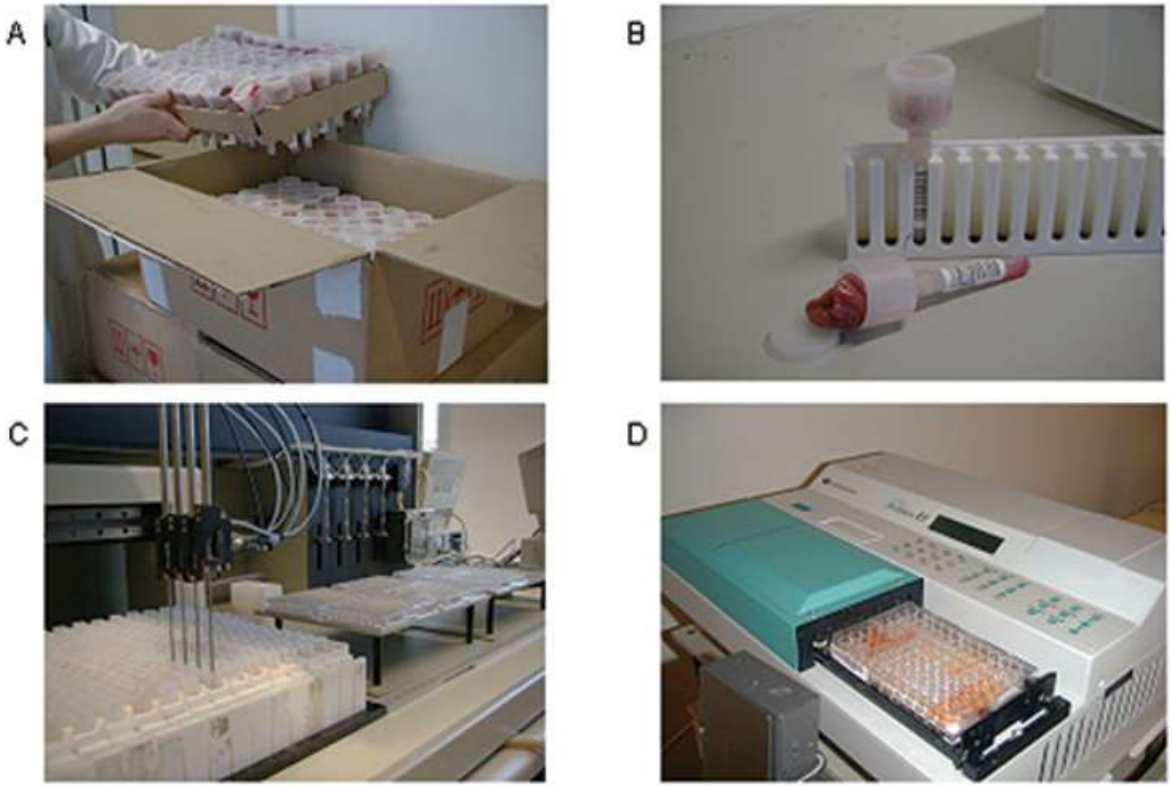
Very similar program

„Cut off“ at 50% (Test and number of samples)



Tests at slaughter

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ELISA

•pigtype Salmonella Ab (Indical Biosciene GmbH)

•Herd Check (IDEXX)

•PrioCheck Salmonella 2.0 ELISA (Prionics AG, Schlieren).

Positive pig are not reprimended at slaughter!

But malus system for Cat III farms

Results are used for national monitoring

Salmonella in the Lab

Contact of three large labs in Germany:

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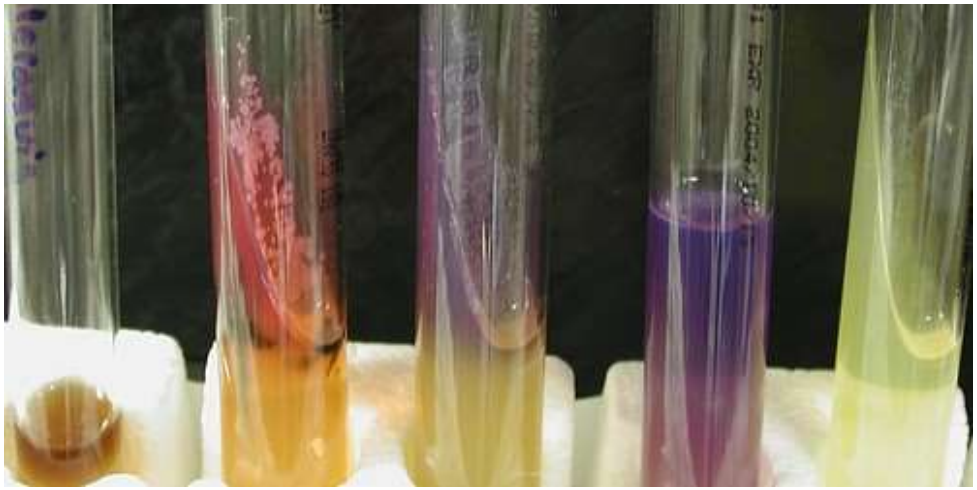
IVD GmbH

Anicon (SAN-Group)



•Positive PCR and culture are registered at the veterinary office of the region – usually no consequences

Cat III farms in Germany

But that`s mainly typhimurium – your problem is coleraesuis!

The first detection of Salmonella enterica subspecies enterica serovar Choleraesuis in farm-raised pigs in Serbia, 2019 (authorea.com)

Salmonella coleraesuis

S. enterica has six subspecies, and each subspecies has associated serovars that differ by antigenic specificity.

These serovars
include *S.* Typhi, *S.* Enteritidis, *S.* Paratyphi, *S.* Typhimurium, and *S.* Choleraesuis

While S. Typhimurium is mostly a problem in the human species – S. coleraesuis is very pathogenic to swine.

S. coleraesuis

Fever

Cyanosis of the skin

especially on the ears, feet and abdomen

look for swelling of the gallbladder, lymph nodes, spleen and liver

Liver: areas of necrosis, varying degrees of icterus severity

bacterial pneumonia such as consolidation of the cranioventral lobes

diarrhea, intestinal lesions

pseudomembranes on the ileum and button ulcers in the colon.

S. Coleraesuis in Germany

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Very few infections

I my career (27 years as a swine vet) seen only twice

LUFA Nord West Lab – „never detected it“

IVD, Anicon – very rare

One case: 800 sows – problems in the finishers in 2018

Solved via vaccination of the sows and piglets with IDT Salmonella colerasuis vaccine and hygiene measures

S. Coleraesuis in Denmark

Also rare, but:

ELSEVIER

Veterinary Microbiology

Volume 176, Issues 3–4, 17 April 2015, Pages 282-291

Reappearance of Salmonella serovar Choleraesuis var. Kunzendorf in Danish pig herds

Karl Pedersen [a], Gitte Sørensen [b], Charlotta Löfström [b], Pimlapas Leekitcharoenphon [c], Bent Nielsen [d], Anne Wingstrand [b], Frank M. Aarestrup [c], René S. Hendriksen [c], Dorte Lau Baggesen [b]

S. Coleraesuis in Denmark

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Highlights

- Salmonella Choleraesuis reappeared in 4 Danish pig herds in 2012–2013.
- Outbreaks were preceded by increased meat juice sero-prevalence.
- Severe disease problems occurred in affected herds.
- Two or three independent introductions occurred based on molecular typing and epidemiology.
- Sources of the infection could not be established.

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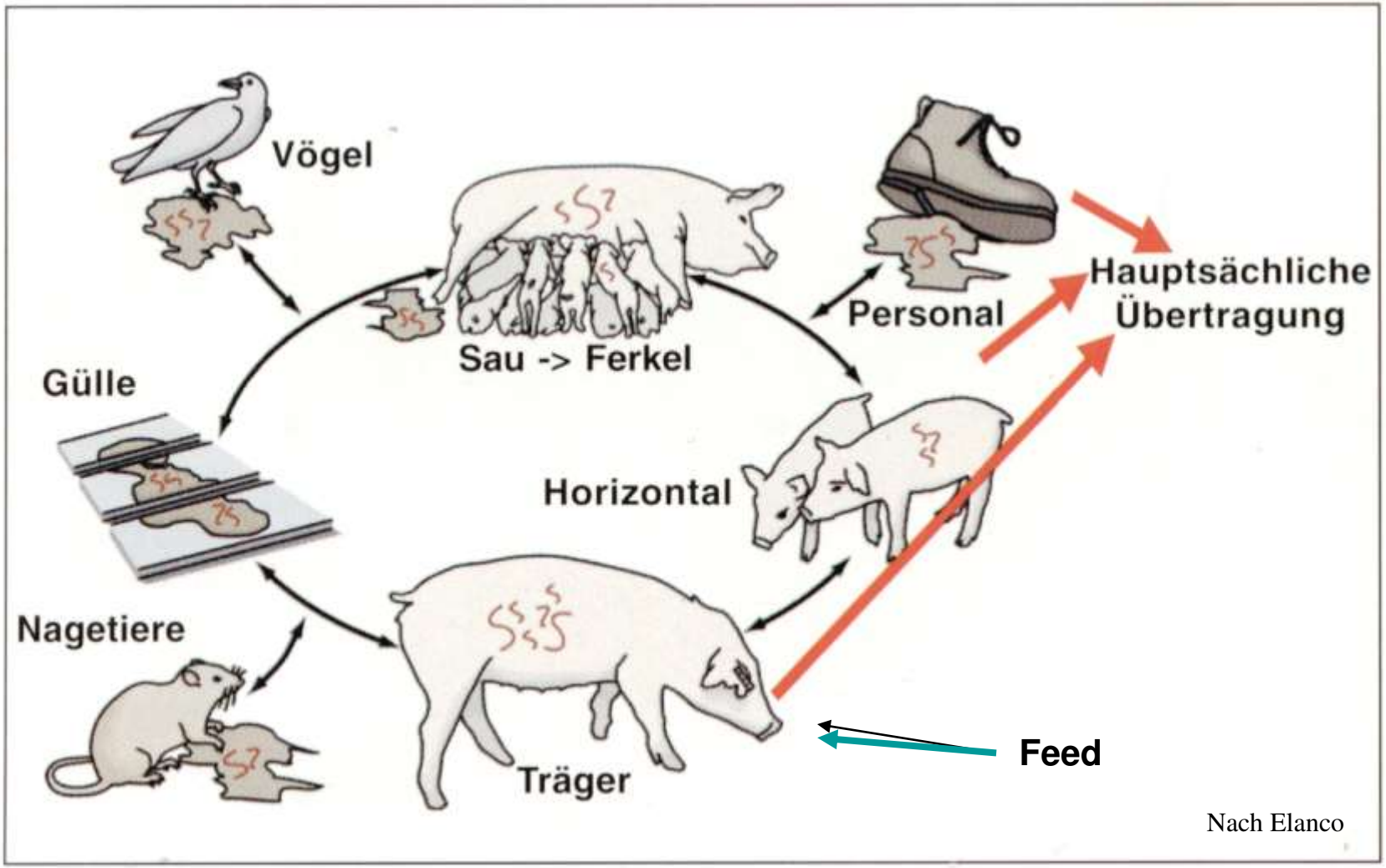
What to do in Salmonella outbreaks? Experiences from Germany

Suggestions are based on the intense experiences of fighting S. typhimurium in Cat III farms

2004-2022

Spreading of Salmonella

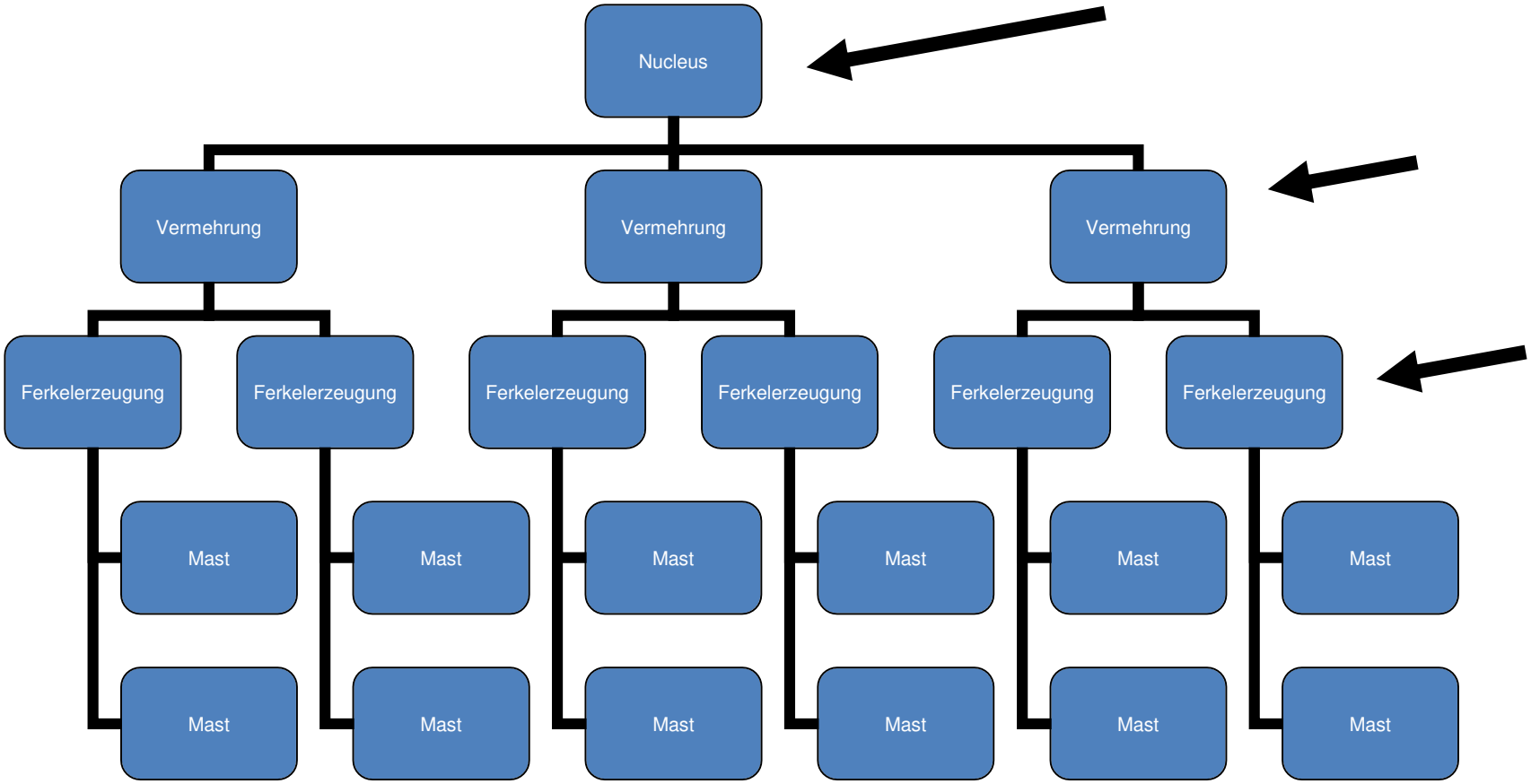


Survival-time of Salmonella

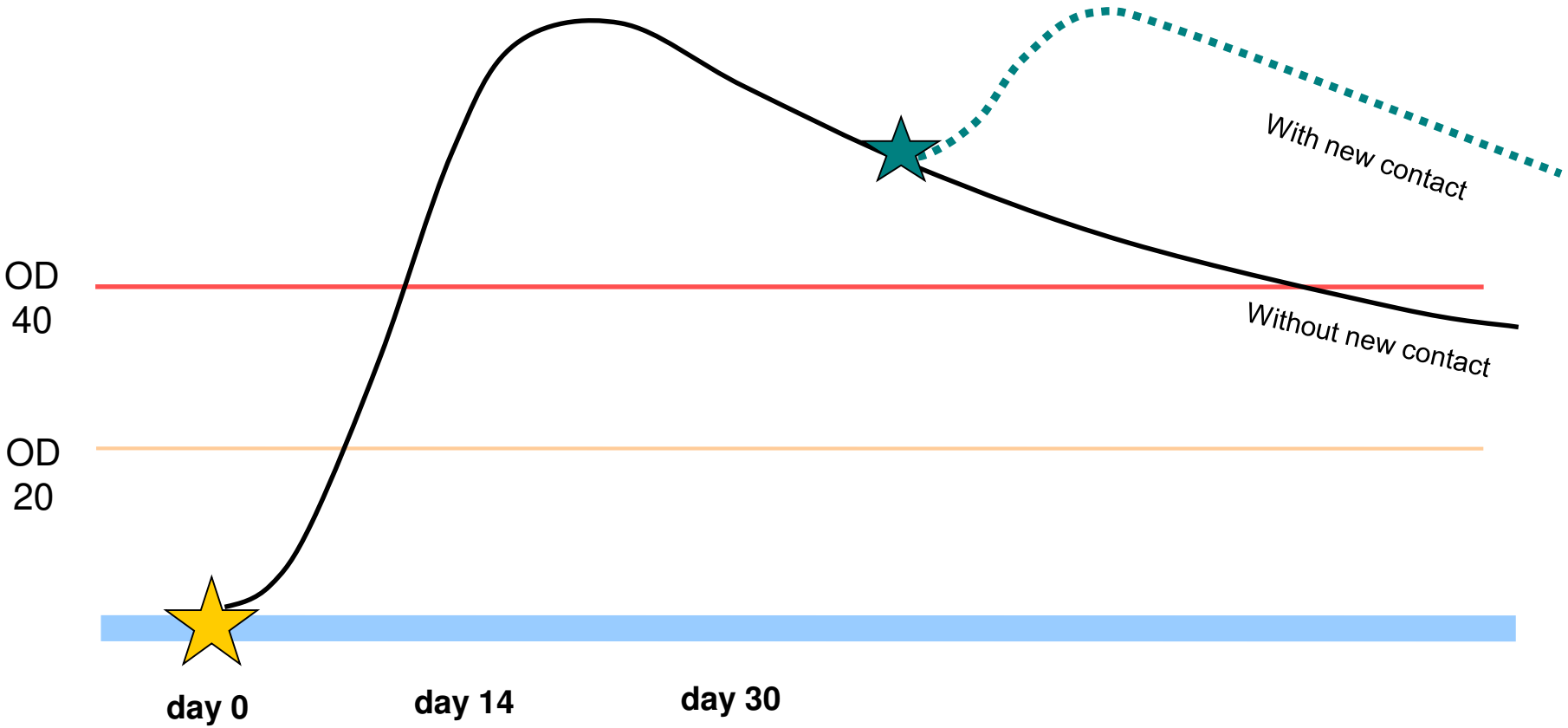
smooth metalsurface	14 days
insects	16 days
humid earth	1 years
dry manure	2,5 years
sewage	2,7 years
dust (roomtemperature)	4 years
dry eggpowder	13 years

SCHÖNING 1999

Problem – pyramidal construction of swine production



Antibody-Development - shematic



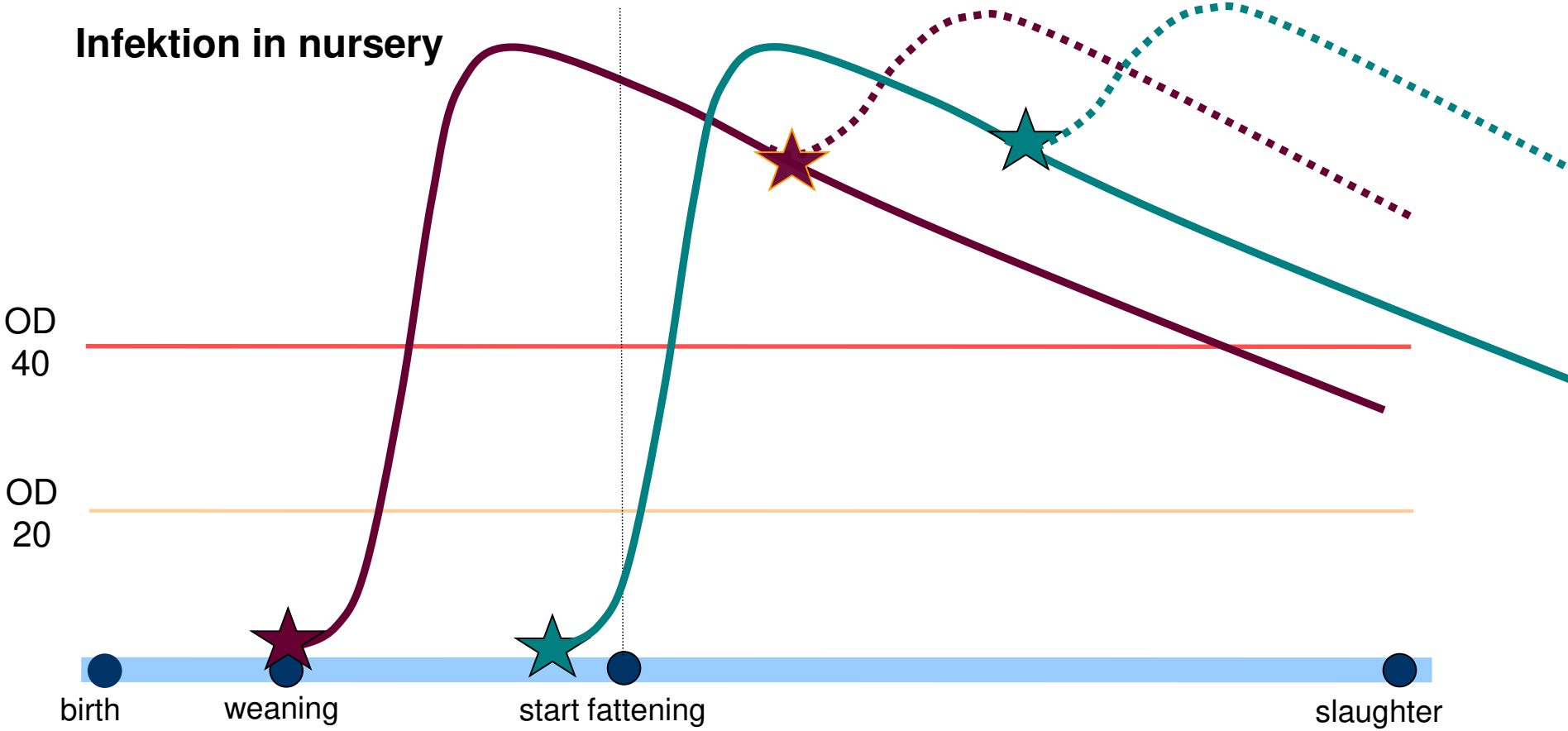
Infectious Phase

Salmonella-carrier

Salmonella-contact

Dr. Sandra Sicken, Schweinegesundheitsdienst NRW

Antibody-development after Salmonella-contact (shematic)



Dr. Sandra Sicken, Schweinegesundheitsdienst NRW

Salmonella-contact

- Feed and feeding technic
- Flour vs pellet
- Dry vs liquid
- Own grain – bought feed

Riskfactors

Manure

Feed

Infected animals

Spring and autumn

Herdsize

Rodents

Additional factors (possible)

Diarrhoe

Continuous flwo systems

Transport and grouping

Overcrowding

Sampling in cat III farms:

pictures: Schulze Horsel

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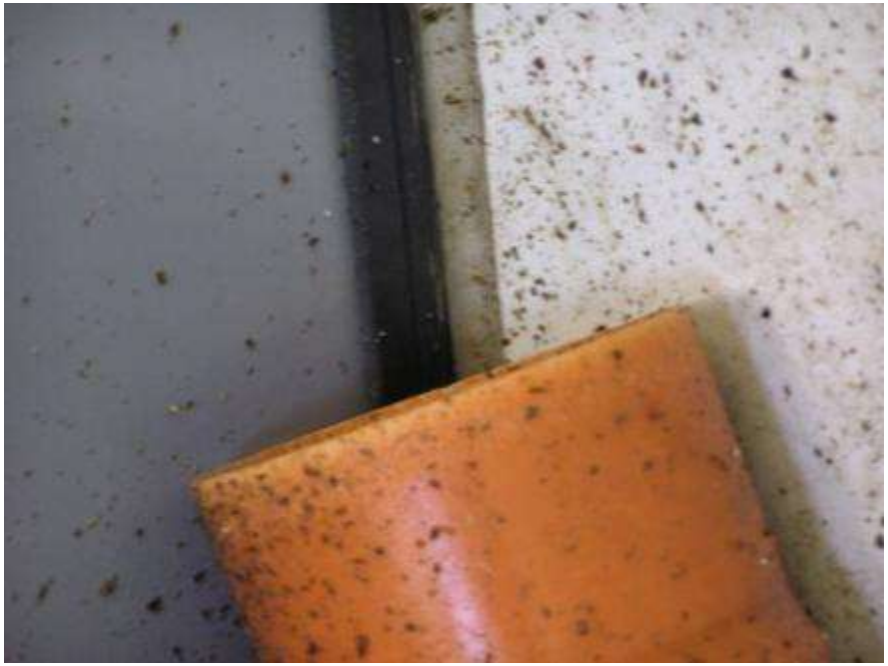
Untersuchungsende 24.07.14

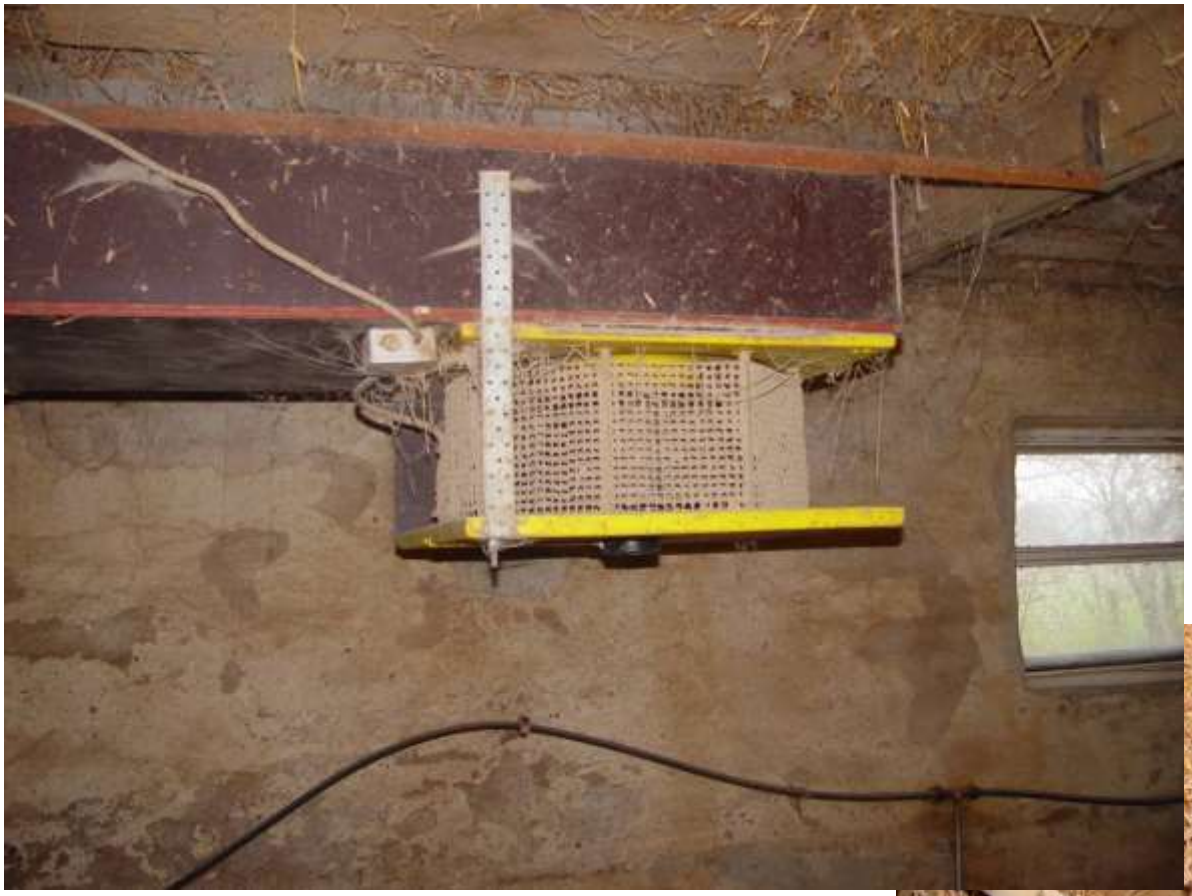
Bakteriologische / Virologische Untersuchung

1	Salm.-Unters. ISO 6579	Lüfter, oben	PROBE	Salm. Typhim. monoph. (O4,5:Hi)
2	Salm.-Unters. ISO 6579	Abluftkanal	PROBE	Salmonellen nicht nachgewiesen
3	Salm.-Unters. ISO 6579	Heizkanone	PROBE	Salmonellen nicht nachgewiesen
4	Salm.-Unters. ISO 6579	Fliegen, Büro	PROBE	Salmonellen nicht nachgewiesen
5	Salm.-Unters. ISO 6579	Printplatte, unten, Abt.7	PROBE	Salm. Typhim. monoph. (O4,5:Hi)
6	Salm.-Unters. ISO 6579	Futterrinne oben, Abt.7	PROBE	Salm. Typhim. monoph. (O4,5:Hi)
7	Salm.-Unters. ISO 6579	Lappen	PROBE	Salmonellen nicht nachgewiesen
8	Salm.-Unters. ISO 6579	Gang	PROBE	Salm. Typhim. monoph. (O4,5:Hi)
9	Salm.-Unters. ISO 6579	Käfer	PROBE	Salmonellen nicht nachgewiesen



pictures: Schulze Horsel

pictures: Schulze Horsel



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Strategies

The acid barrier

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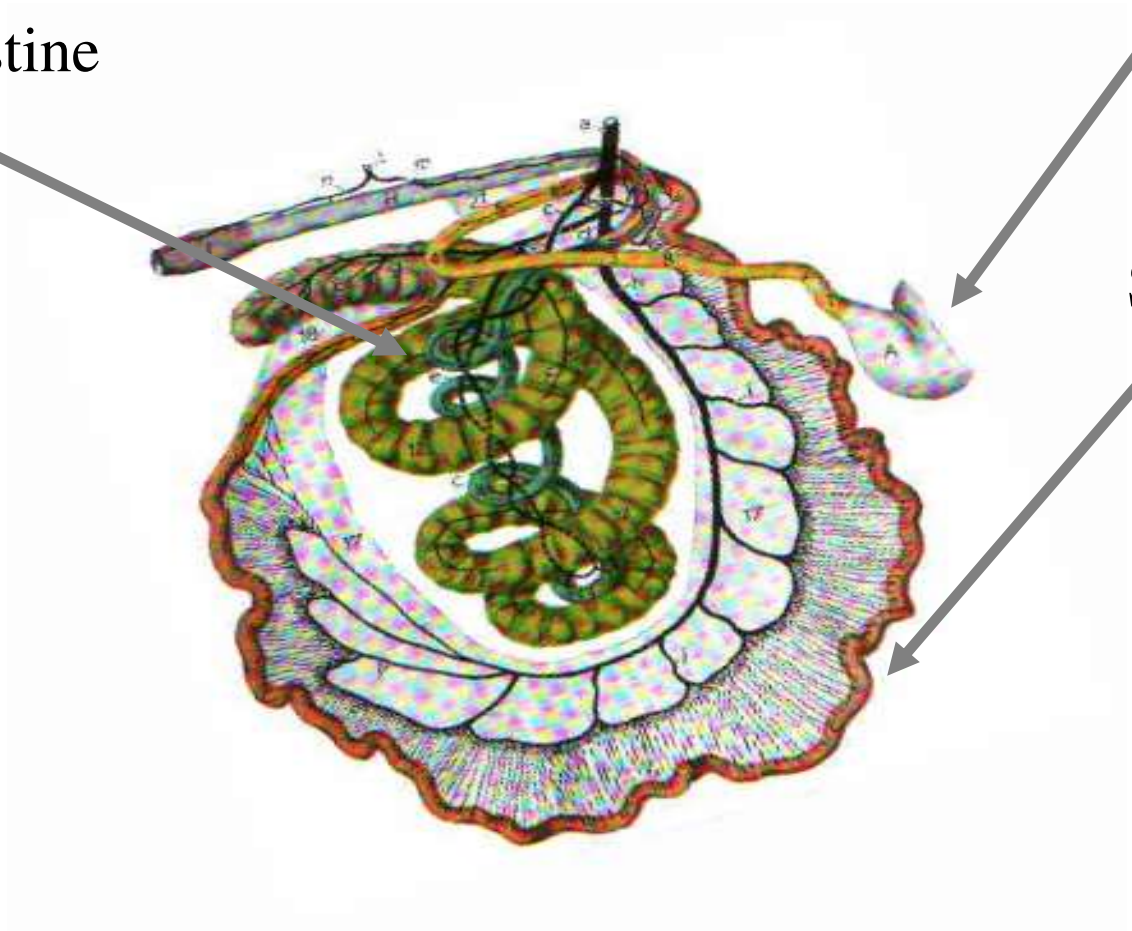
stommac

pH 2-3

Large intestine

pH +/- 6



Small intestine

pH +/- 4,5

Different acids and mixes and their inhibitory concentrations

	Formic-acid	Propionic-acid	Milk-acid	Lupro-Mix	Lupro-Mix NC	
S. typhimurium	0,1	0,15	0,3	0,15	0,25	
E.coli	0,15	0,2	0,4	0,2	0,3	
S. aureus	0,15	0,25	0,4	0,2	0,3	
Cl. perfringens	0,1	0,25	0,3	0,15	0,3	
MHK	0,12	0,21	0,32	0,14	0,24	

Strauss u. Hayler 2001

Vaccination

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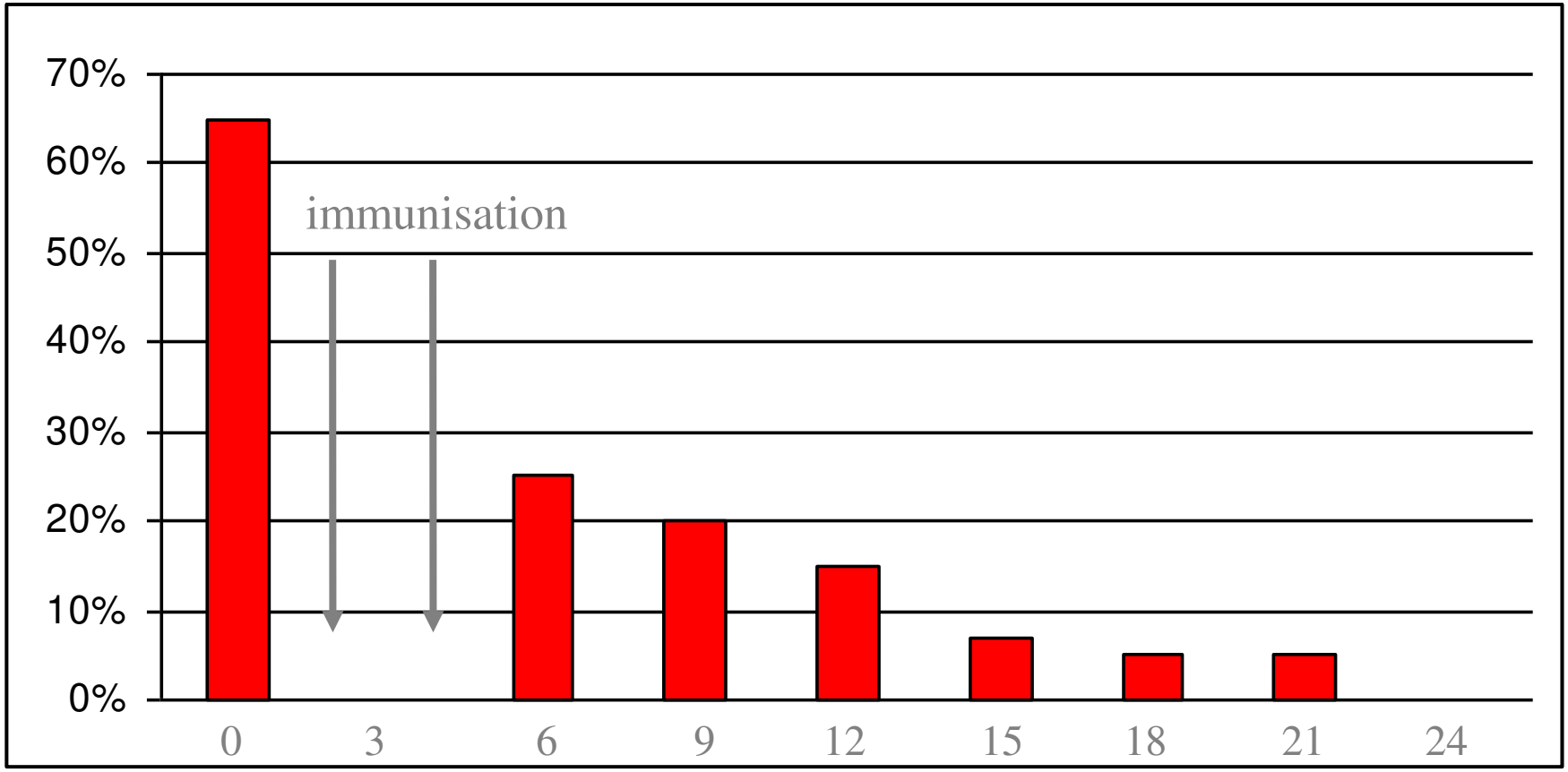
SALMOPORC

Suisaloral	Salmonellen-Infektion	Ceva Tiergesundheit GmbH	PEI.V.11873.01.1	23.01.2017	Schwein

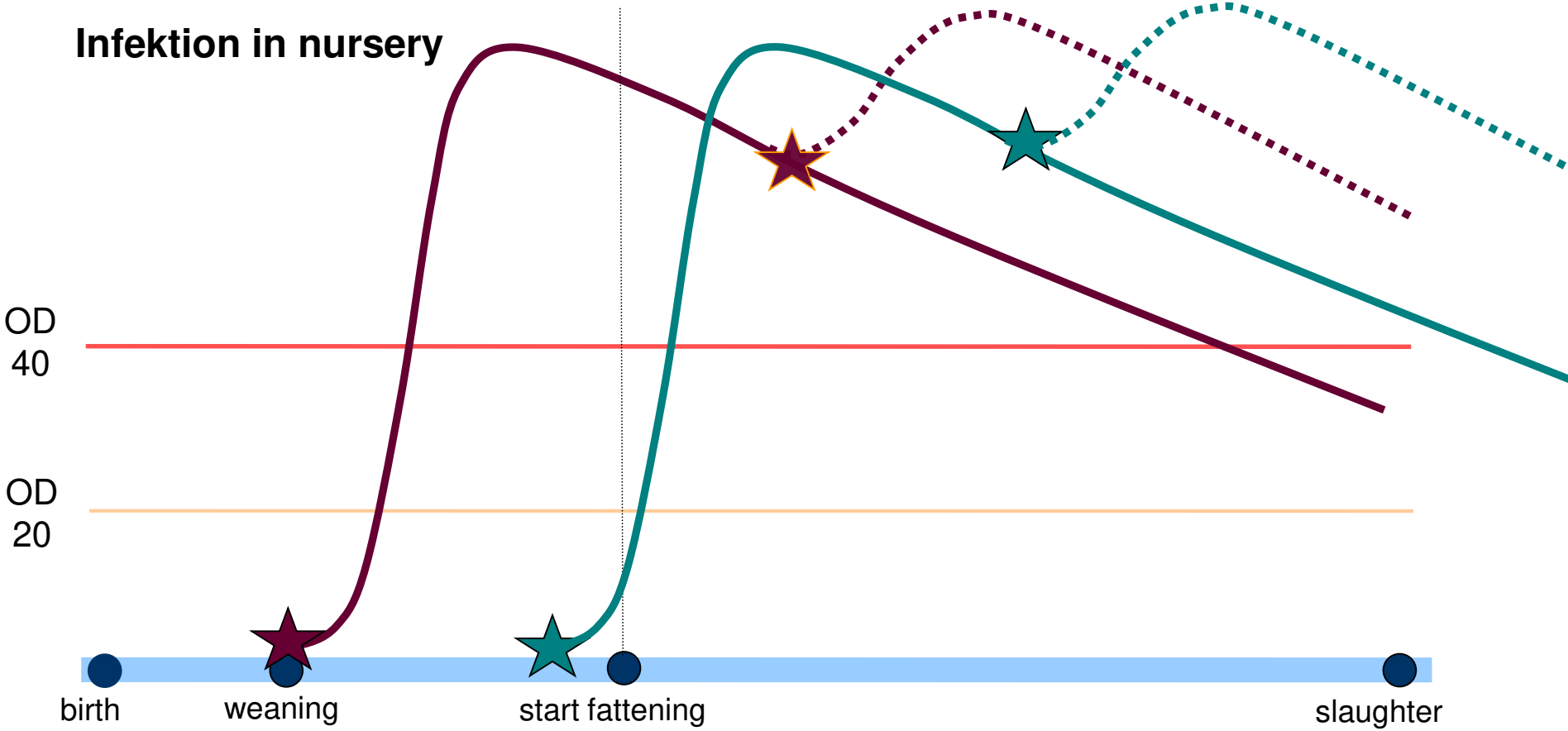
Excretion of salmonella after vaccination

40 sows, single samples



Ortmann 1999

Antibody-development after Salmonella-contact (shematic)



Dr. Sandra Sicken, Schweinegesundheitsdienst NRW

Salmonella-contact

The role of the vet

Advice

In Cat. III farms

Own investigations

- **farm 1:**
  - Finisher 300 places old farm
  - 700 places new farm
  - 75% pos. samples
  - 2 sowherds (feces neg,)
  - Ducks at old farm
  - 1 silo pos. At new farm
  - measurements: cleanig of silo, no more ducks, acid into feed
  - Last sampling 18% pos.

Own investigations

- **farm 2:**
  - finisher 2600 places, 2 sites, renewed buildings
  - 68% pos. samples
  - 1 sow farm
  - feces and surrounding neg.
  - Old low pressure water system
  - measurements: renewing of water system, acids in feed
  - Dropped to 42 % next sampling

Own investigations

- **farm 3:**
  - Closed herd, 170 sows, 500 finischers
  - Old buildings
  - Part of a biogas company
  - 85% pos. samples
  - Open silage
  - Serology: highest tites cols to silage
  - High pressure of rodents
  - measurements: acids, better C+D, professional rodent combat
  - ½ year later 27% pos. samples

Own investigations

- **farm 4:**
  - finisher 1200 places
  - Rented it new, rel. new buildings
  - 80% pos. samples
  - Former high roden pressure
  - Ceiling full of rat-manure
  - measurements: acids, better C+D, professional rodent combat
  - Cleaning of the ceiling

Own investigations

- **farm 5:**
  - finisher 1600 places
  - New barn, geothermal heat exchanger
  - 75% pos. samples
  - No rodents (due to the farmer)
  - Manure was over the slats
  - Under the slats in air pipes still manure and rodents!
  - measurements: acids, better C+D, professional rodent combat

Own investigations

- **farm 6:**

– **Sow farm 700 sows, closed herd**

  – New barn, nursery plastic walls

  – 90% pos. samples

  – No rodents

  – No manure over the slats

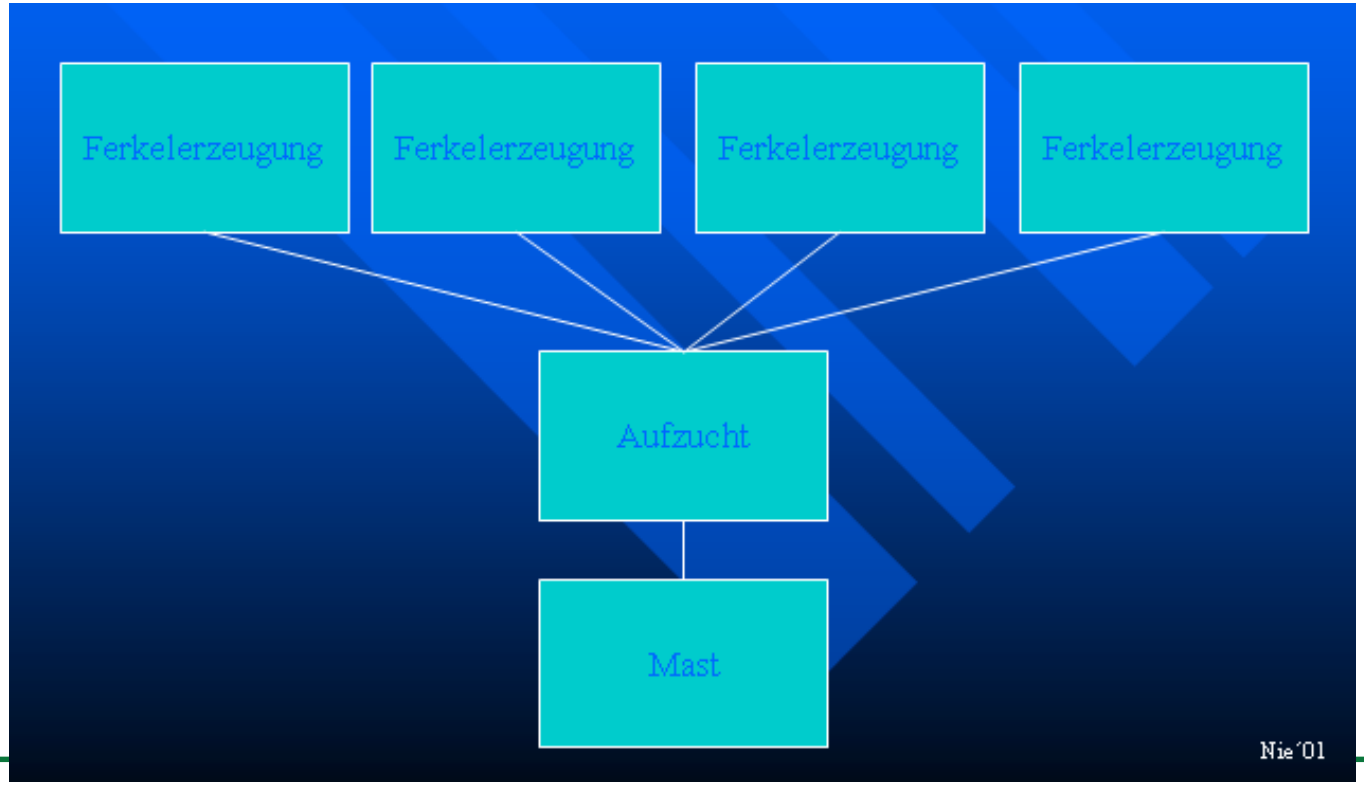
  – Begin nursery neg., end nursery 90% pos.

  – With C+D manure „pressed“ into the next compartment

  – measurements: acids, more intenseC+D, compartment „sealing“, Salmonella vaccination of gilts

Own investigations

- **farms 7:**
  - „green line“



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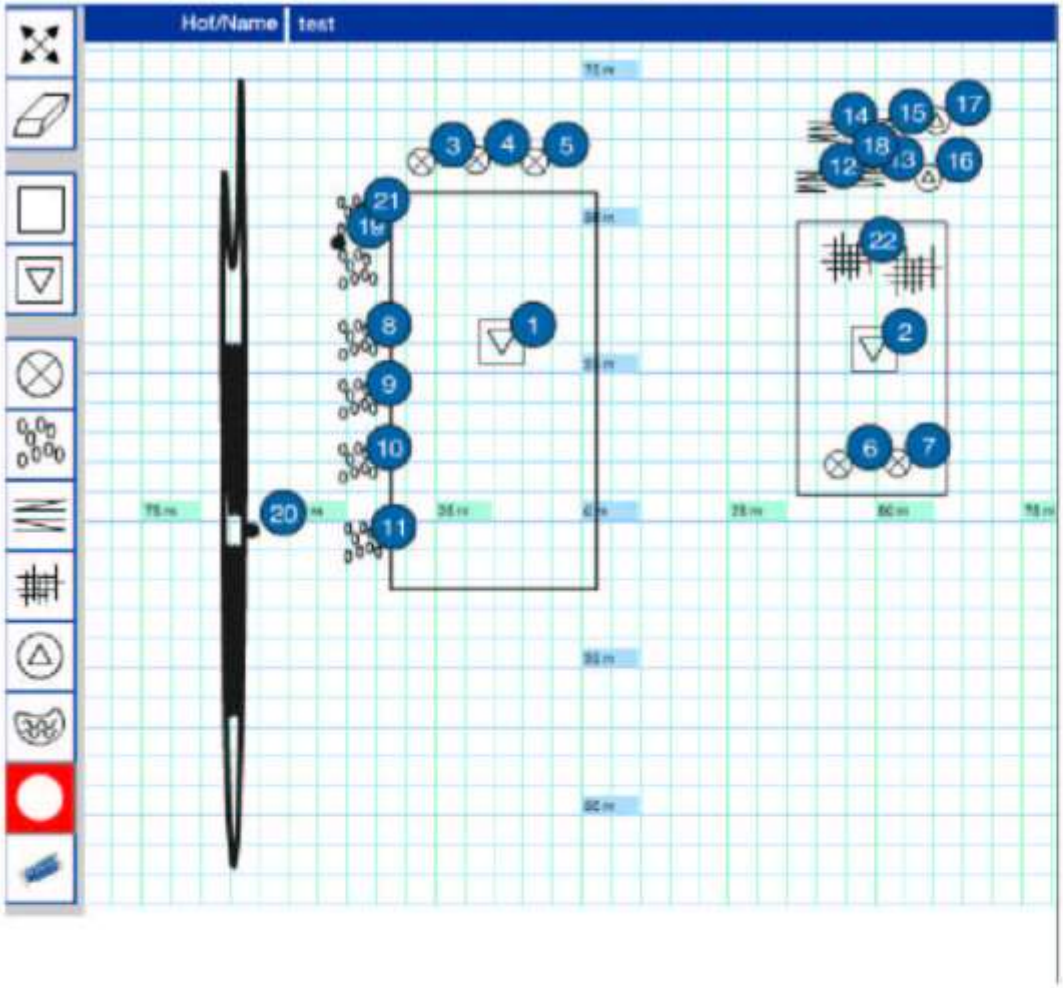
Zeichnen Sie hier im **Erdgeschoss** Ihre Gebäude und das umliegende Gelände. Benutzen Sie dazu die Werkzeugleiste links unten! Drucken und/oder speichern Sie den fertigen Lageplan. Um die Obergeschosse der Gebäude zu zeichnen wechseln Sie bitte in das **→Obergeschoss**

Bayer



Bitte wählen Sie:

- ▶ Startseite

Bekämpfungsplan:

- ▶ 1. Anleitung
- ■ 2. Lageplan
- ▶ 3. Datenblatt

Zeichenhilfe:

- Z+ / Z- → Köderstellen einblenden
- → Köderstellen ausblenden
- 1:1
- → Drucken...
- → Löschen...
- → Öffnen...
- → Sichern

Internal biosecurity

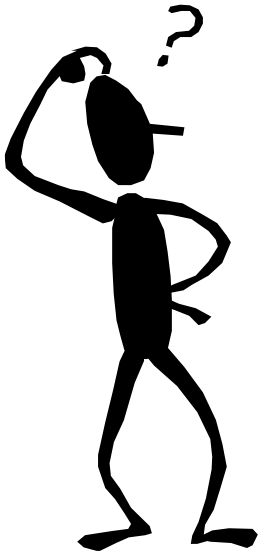
What helps the best concept if I do not

manage to bring down the internal infectious

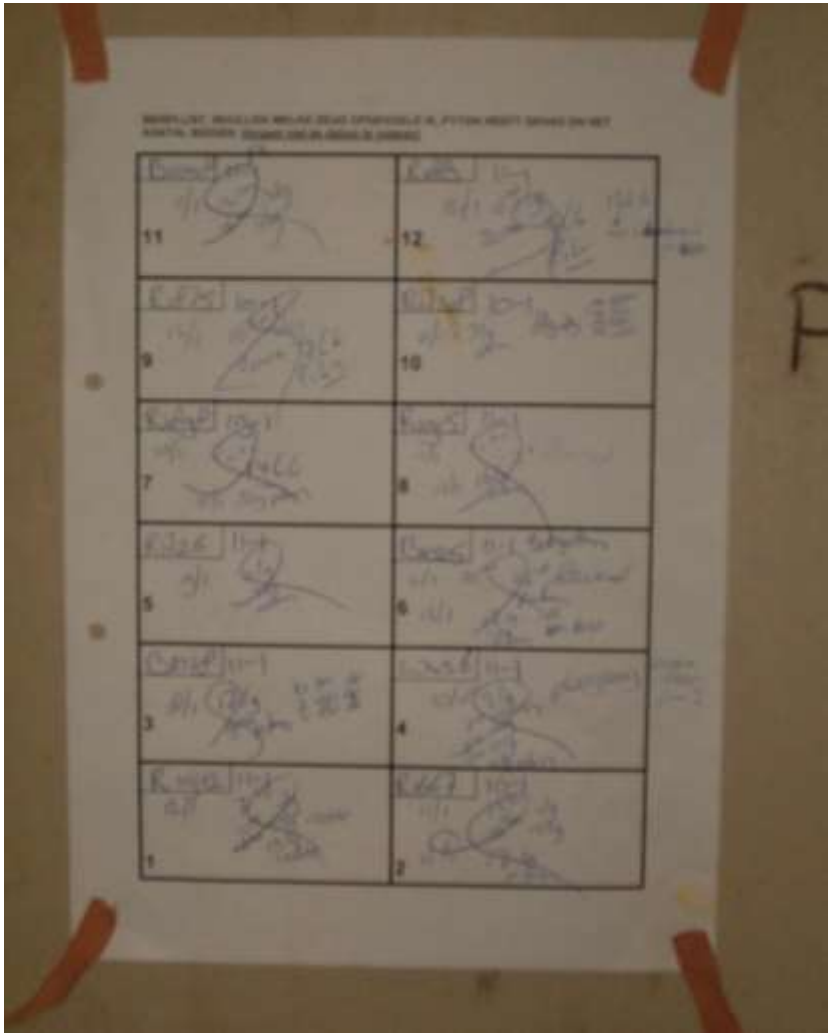
Pressure!!!

because:

Only one gram of feces is enough!!!!

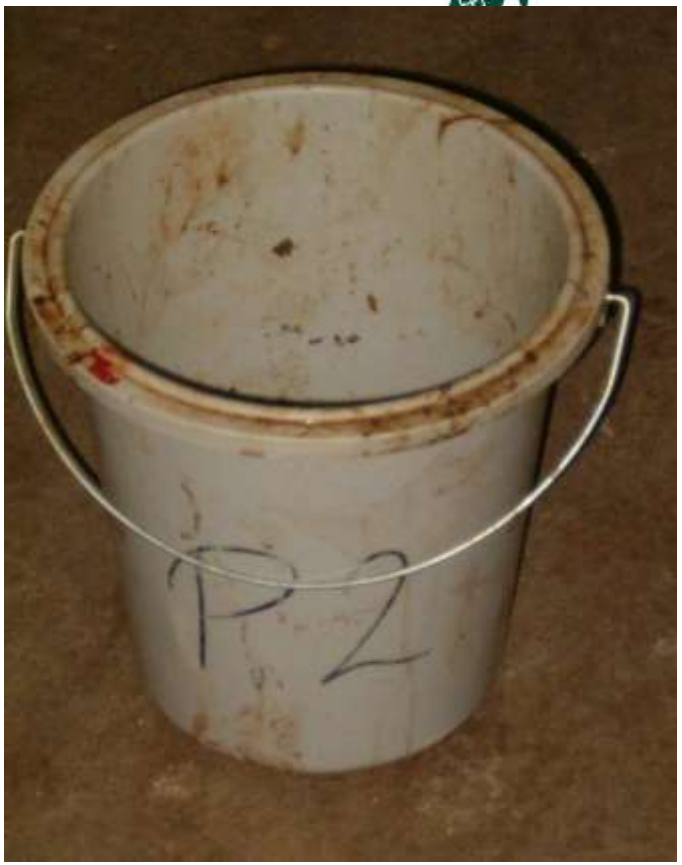


clean materials



comunication

Colors per barn



materials per compartment

boot-management


closed walls between pens

Management of sick pigs

The role of the authorities

Regional veterinary offices (farm level)

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- Regulation (EC) No 2160/2003 of the European Parliament and of the Council of 17 November 2003 on the control of salmonella and other specified food-borne zoonotic agents

- Regulation to reduce Salmonella in slaughterpigs

↓

Not very much interested in the monitoring program neither positive cultures or PCR‘s on farm level

„collect“ the data for the national monitoring

Our feeling about salmonella in germany

- **S. coleraesuis is not a problem**
- **Veterinary officers do not really care**
- **About 1,5% of Cat III farms at the moment**
- **Measurements: AIAO, internal biosecurity,** dont`t mix pigs **rodent management, check the breeding and sow farms**
- **Acids into the feed**
- **More barley and rye (butyric acid)**
- **Flour vs pellet**
- **Vaccination of sows / gilts**

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Schweine-Gesundheitsdienste

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ARBEITSGRUPPEN

AG SALMONELLEN

Leiter: **Dr. Schulte-Wülwer**, Niedersachsen

Salmonellenleitfaden

AG RHINITIS ATROPHICANS

Leiter: **Dr. Alt**, Niedersachsen

AG RÄUDE

Leiter: **Dr. Baier**, Niedersachsen

AG Räude

AG PRRS

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„ only exact implementation leads to success“