

Surveillance and Eradication of Salmonella Dublin – the Danish Way

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SEGES, Danish Agriculture & Food Council

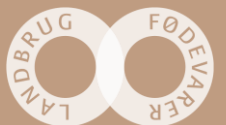
Støtte af

Kvægafgiftsfonden

STØTTET AF

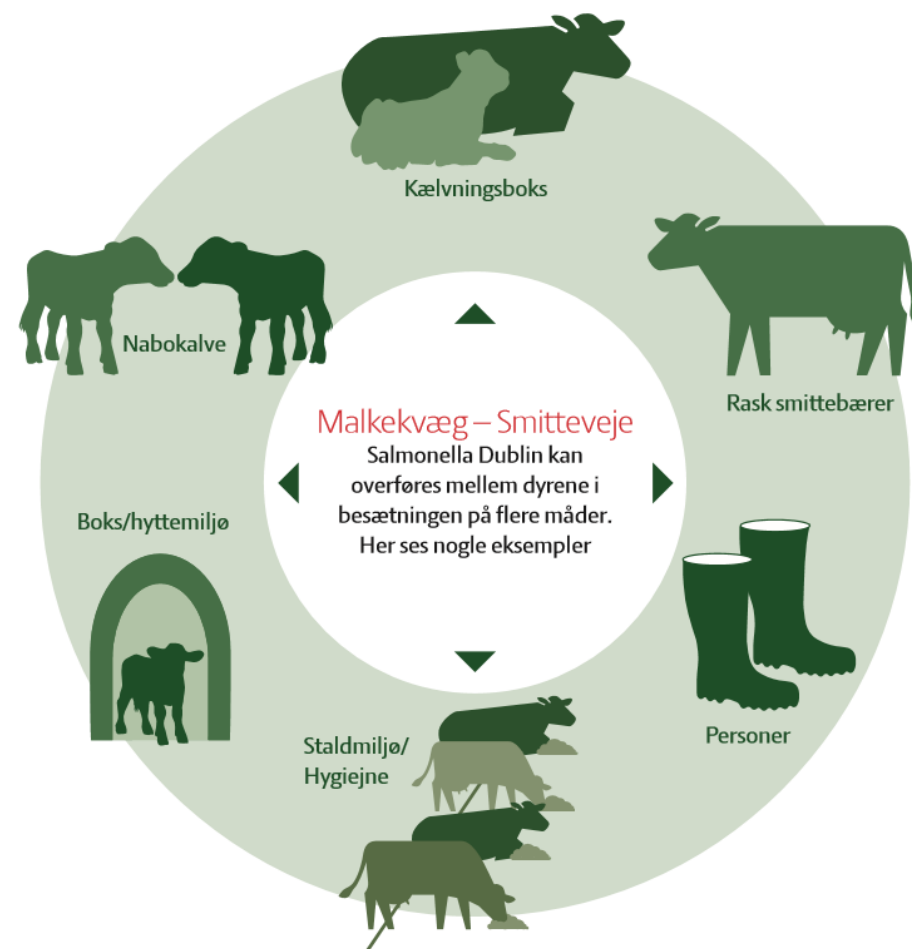
Mælkeafgiftsfonden

SEGES



Agenda

- Presentation: Me, Denmark and Salmonella
- National surveillance and status
- History and some of the changes in the National Program
- Legislation
- Outbreaks – cases
- Transmission routes
- Eradication – farm level
- Future in Denmark



Presentation



- Graduated in 2001 from The Royal Veterinary and Agricultural University in Copenhagen with a degree in veterinary Medicine
- 10 years working in private Vet. Practice
- 2010 DVA Certificate in Dairy Herd Health
- 2010-2015 Official vet , the Danish Veterinary and Food Ministry –biosecurity, contingency preparedness and prevention of animal disease
- 2015 – part of a team of veterinarians working for the Danish farmers organisation
- 2019 ICF certified coach

Denmark



- Population 5.8 million people
- Size 42.924 km²
- Herds 15.872
- Dairy herds 2776
- Dairy cows 570.000
- Average herdsize 210
- Cattle 1.530.000

Salmonella Dublin - severe zoonosis

- 20-50 Human cases annually
- Septicaemia
- Difficult to treat
- High mortality rate
- Beef-Contaminated
- Unpasteurised Milk Products



Salmonella i hakket oksekød – har du spist det?

17-46 12. okt 2015 | Af Jonathan Lykke Lilmoes, jl@newsbreak.dk



Hakket oksekød med salmonella-bakterier er solgt til en række spisesteder – holtbarhedsdatoen er overskredet. Foto: Colourbox

Vil vi se et fin 2016?

I denne seneste rapport skriver vi om, hvordan firma, fortæller vi, hvor er på vej hen og hvorfor et "must-read", indeholder aktiemarkedet samt en analyse, du kan bruge det samme. Udnyt muligheden.

Klik her for at downloade

FISHER INVESTMENT

Få de seneste nyheder

Timed r

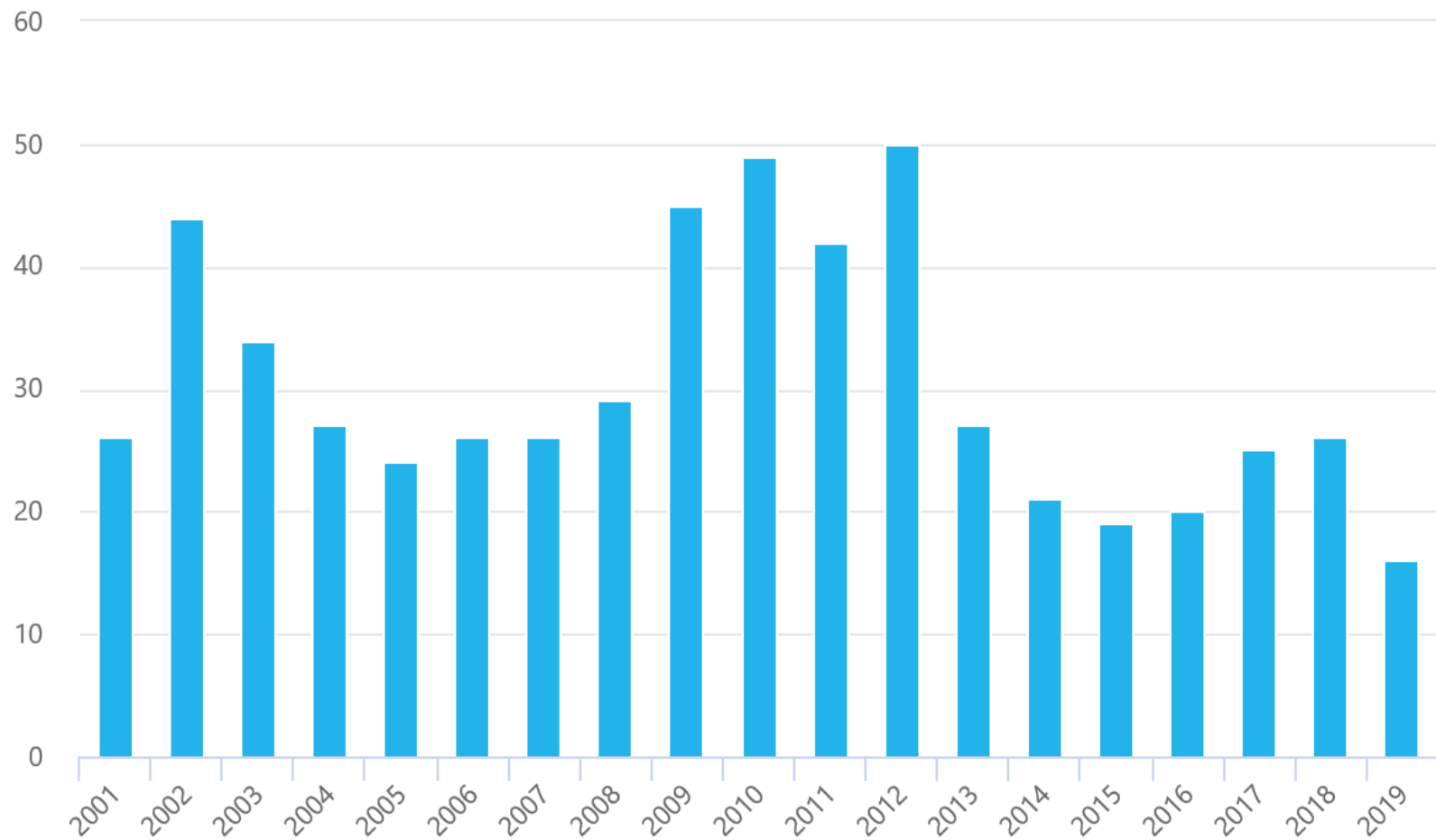
Del på Facebook

Tjek lige efter en ekstra gang, hvis du for nylig har fået hakket oksekød. Måske har det været inficeret med salmonella.

Fødevarestyrelsen oplyser mandag aften, at et helt parti hakket oksekød trækkes tilbage, fordi der er fundet salmonella-bakterier i det.

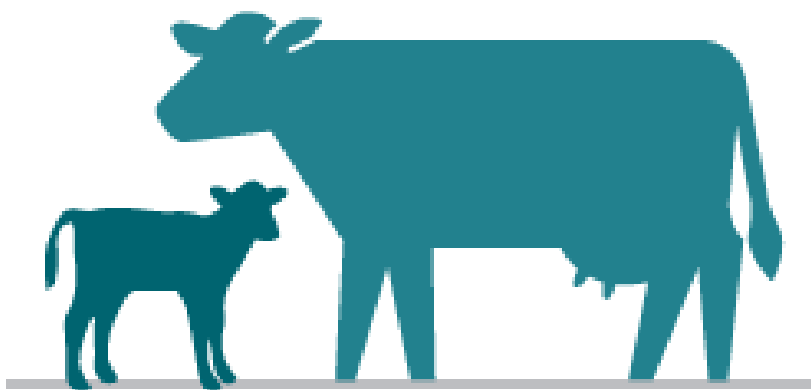
Humane S. Dublin cases in Denmark

Antal tilfælde af Salmonella, Type: S. Dublin, År: 2001-2019



Statens Serum Institut

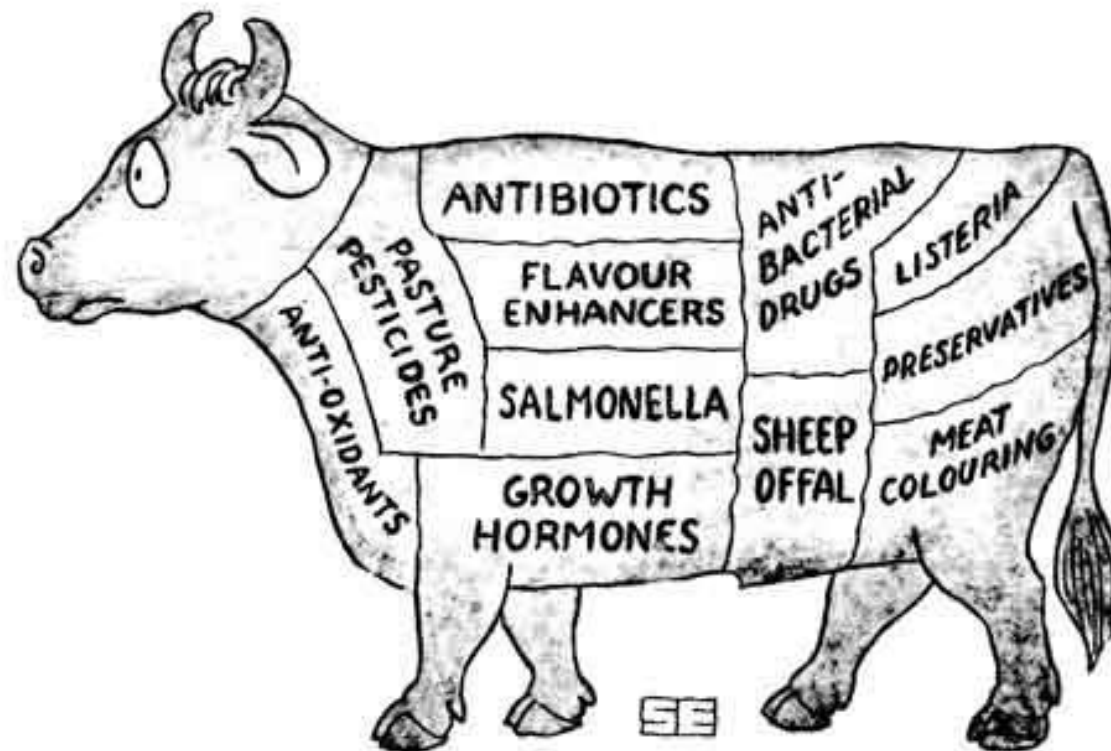
Why?



- More disease in infected herds.
- Less production in infected herds.
- Risk of salmonella contamination to personnel in infected herds.
- Risk of transmission of salmonella bacteria to beef-food safety.
- Risk of infection to other herds in the immediate vicinity

Consequence

- What we know:
 - Increased mortality
 - Increased morbidity
 - Reduced milk yield
- What we think:
 - Reduced growth and increased feed consumption
- What we fear:
 - Salmonella in meat at the slaughterhouse – or the consumer



Surveillance

Bulk tankmilk
Herd

Blood or milk sample, heifer
rearing
Individual Animal

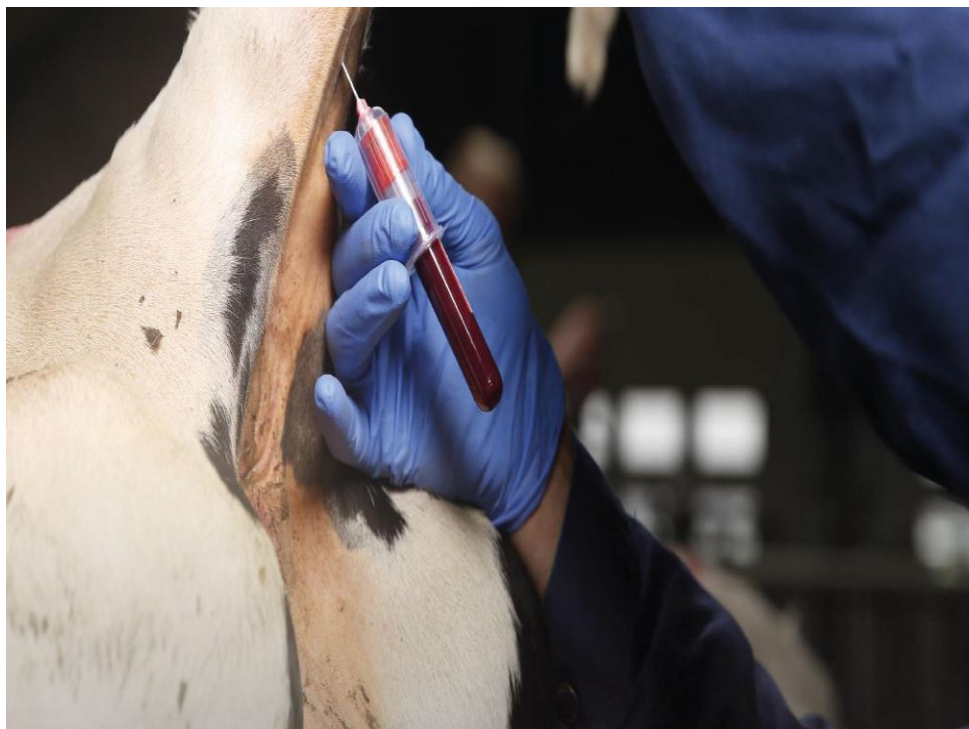
Blood from slaughter
Herd

Salmonella 4/yearly,

Salmonella 1 – 4/yearly

Salmonella 4/yearly,

Definition of a Salmonella positive herd



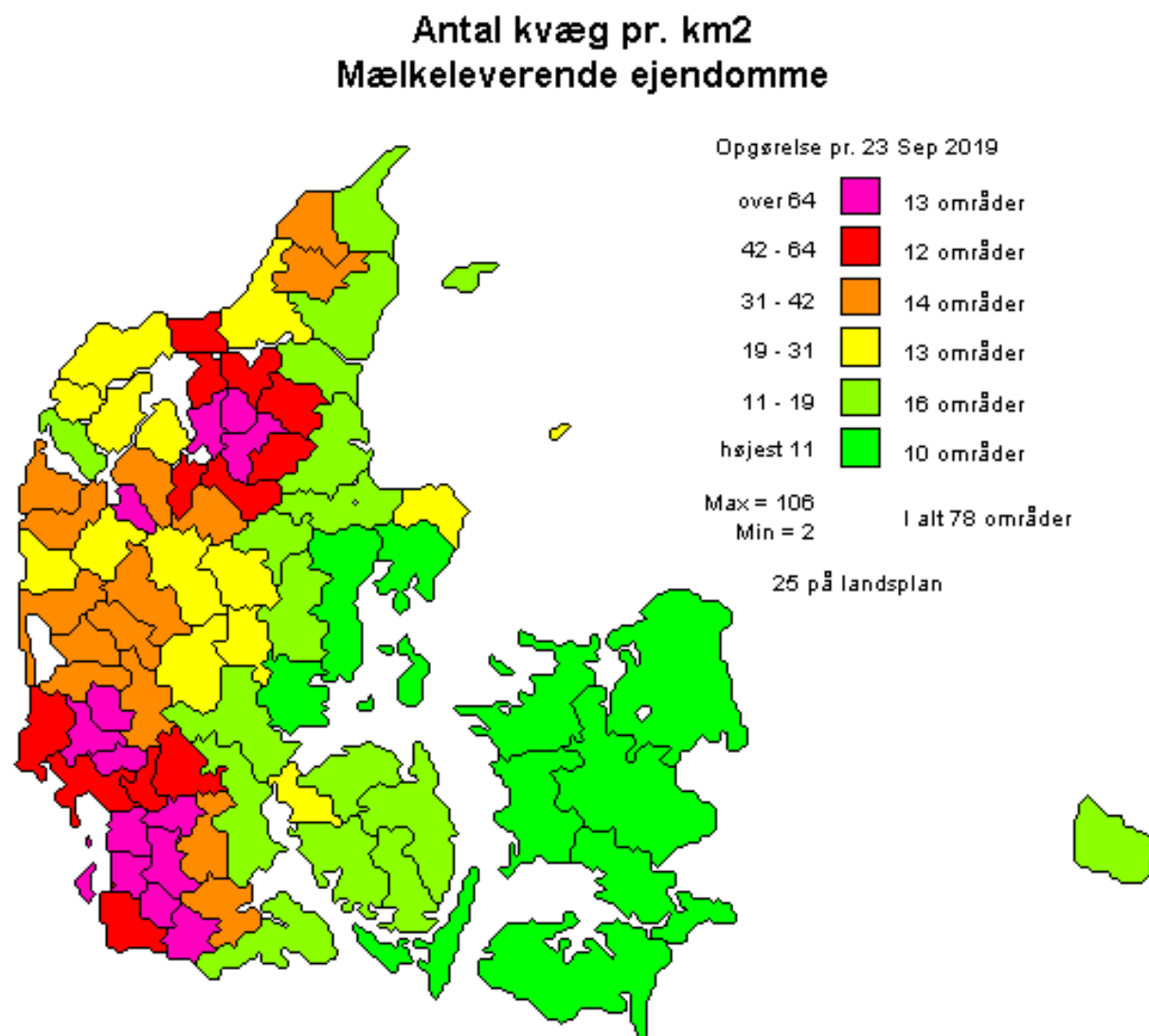
- Bulk tank milk antibody test (ELISA) above 25 ODC %
- Average of the last 4 above 25 ODC %
- A valid test – 21 days since last one
- One positive blood sample – slaughter or test of animals in the herd – cut off value 50 ODC %

Definition of level

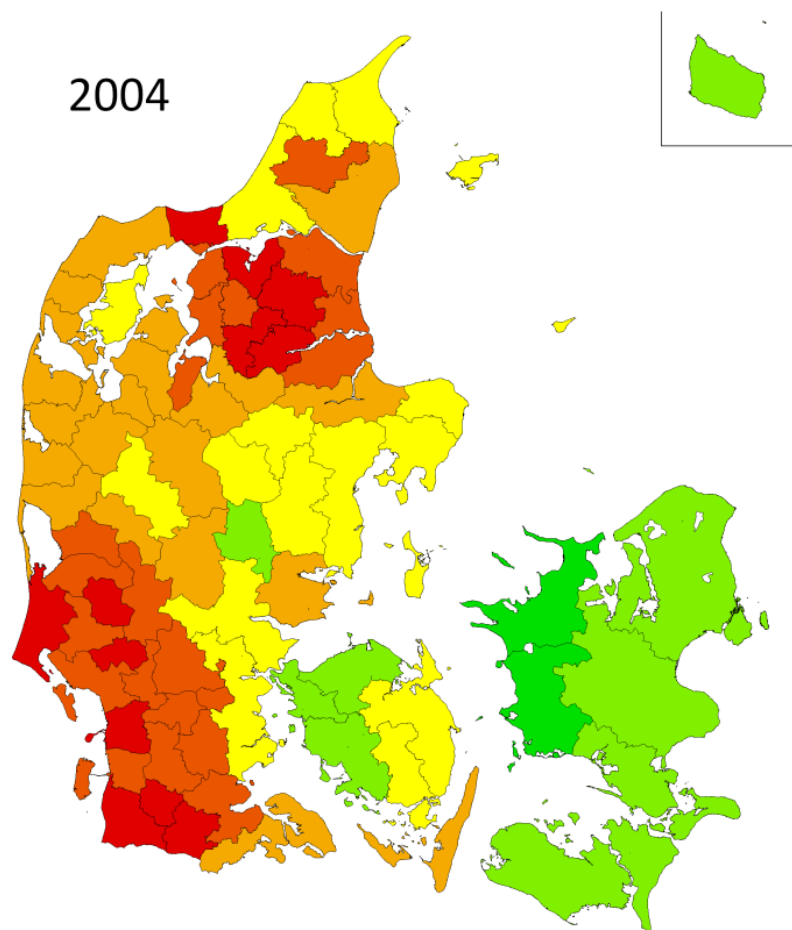
- Salmonella Dublin level 1 – probably free from Salmonella
- Salmonella Dublin level 2 – positive herd, restrictions and demands for eradication etc
- Salmonella Dublin level 3 – positive herd, clinical outbreak with positive findings of bacteria or positive testing because of the Salmonella program



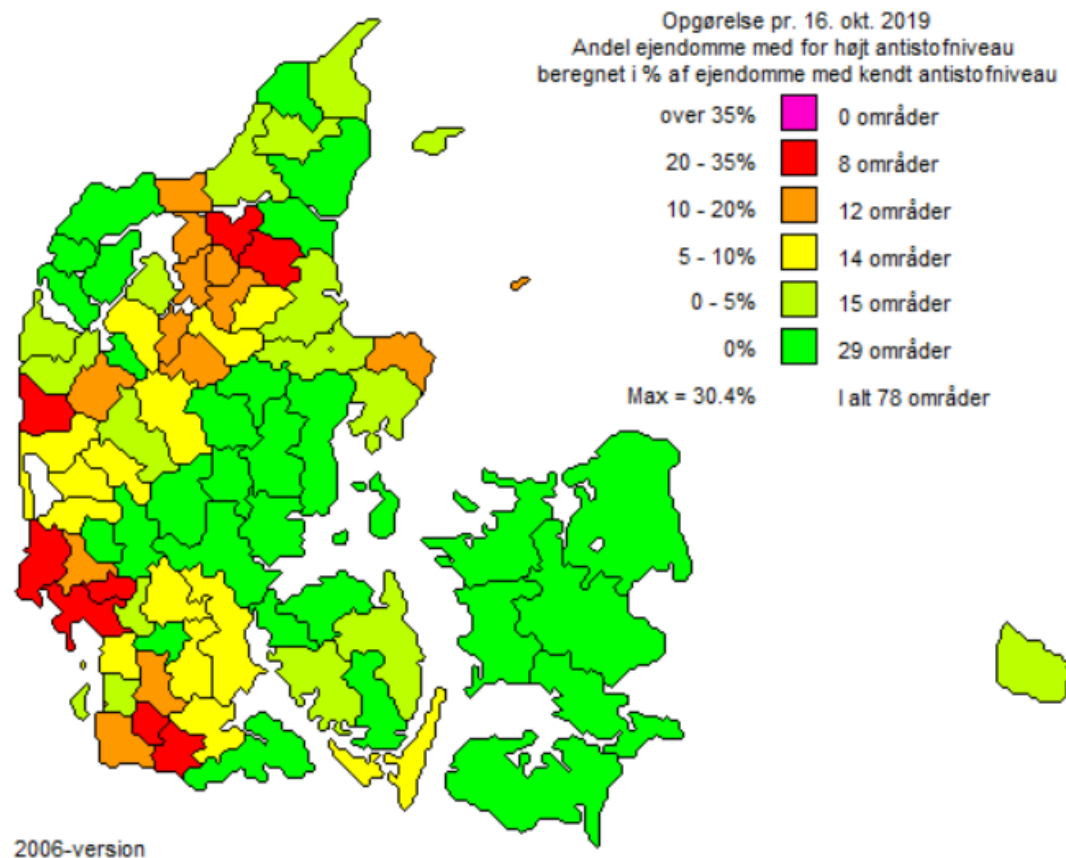
Cattle density



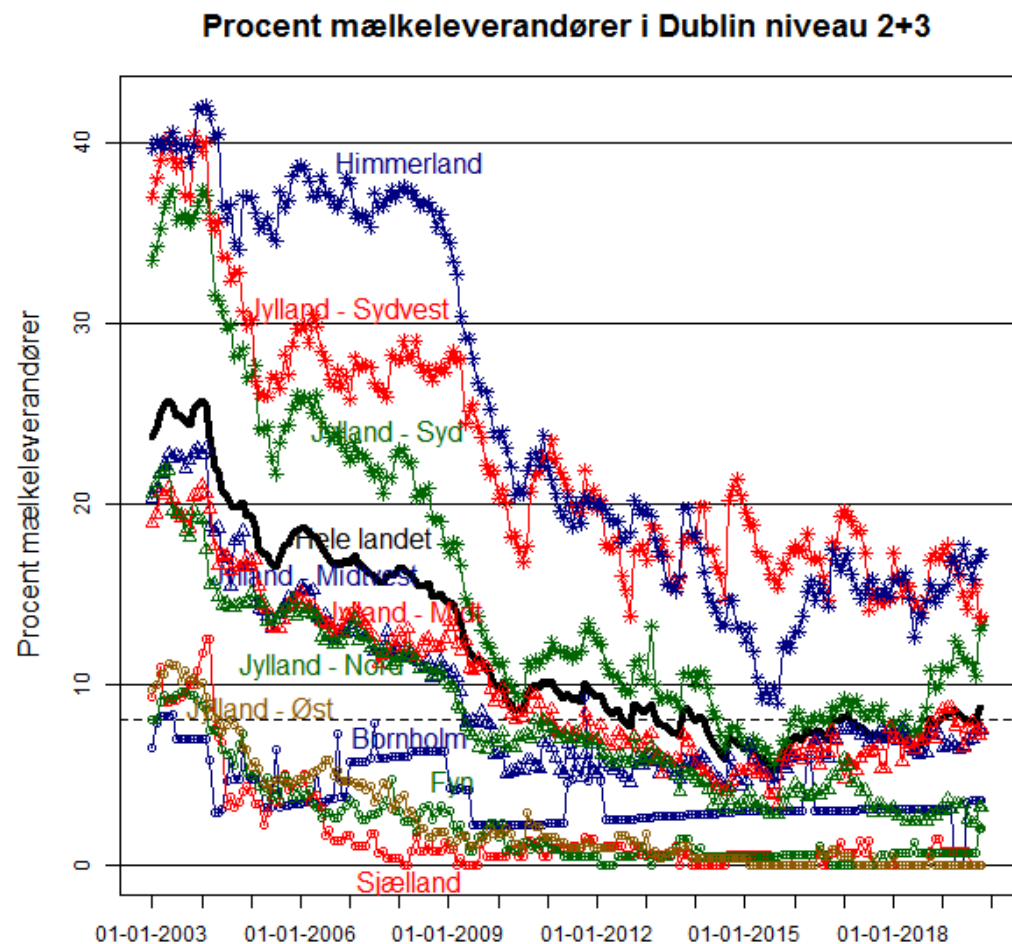
Development in dairy herds between 2004-2019



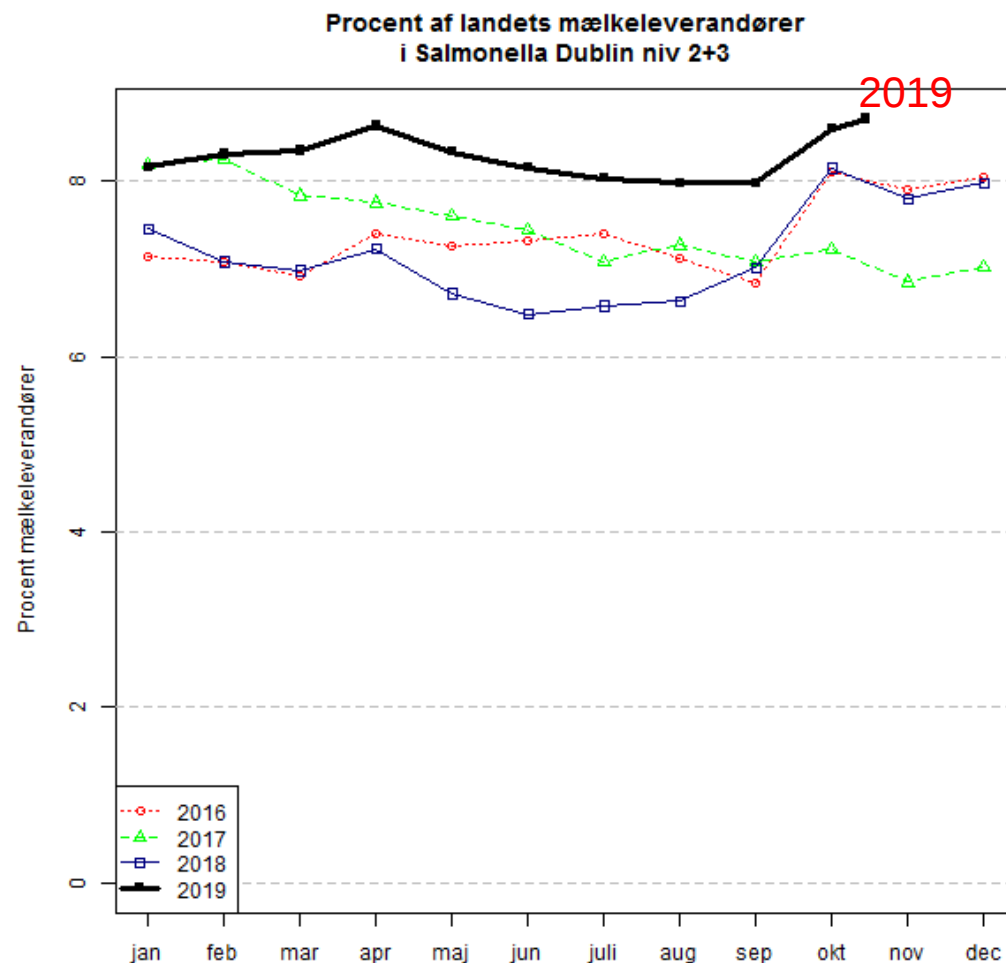
Antistoffer - Salmonella Dublin Mælkeleverende ejendomme



Development in Danish Dairy herds



Graftid: 16 okt 2019 kl 09:45



Graftid: 16 okt 2019 kl 09:45

Eradications of infectious diseases in cattle in Denmark

1

- Screening
- Voluntary actions

2

- Surveillance
- Mandatory actions

3

- Surveillance/eradication
- Governmental restrictions in positive herds

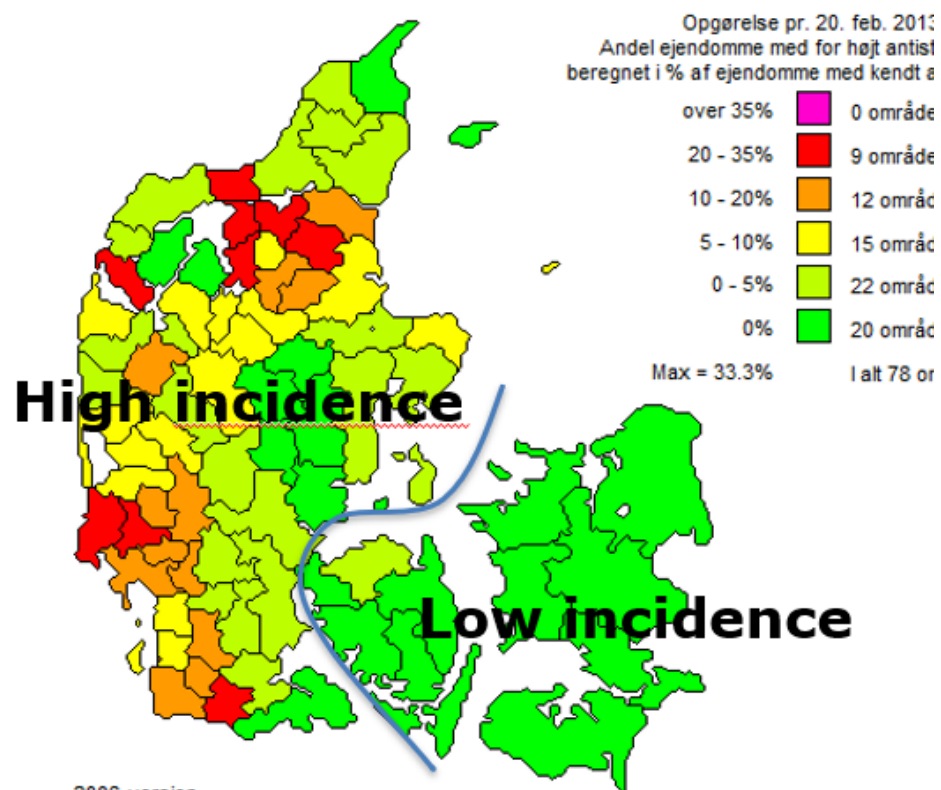
History – The Danish Program

- 2002 – surveillance starts
- 2007 – 2009 Voluntary effort
 - Idea generation and testing, informations campaign
 - Establishing advisory network, manuals, Farmer Fields Schools
- 2010 – 2012 Trading restrictions
- 2013 – 2016 Legislation for positive herds
- 2017 – 2019 Further restrictions for positive herds
- 2020 – GOAL.....

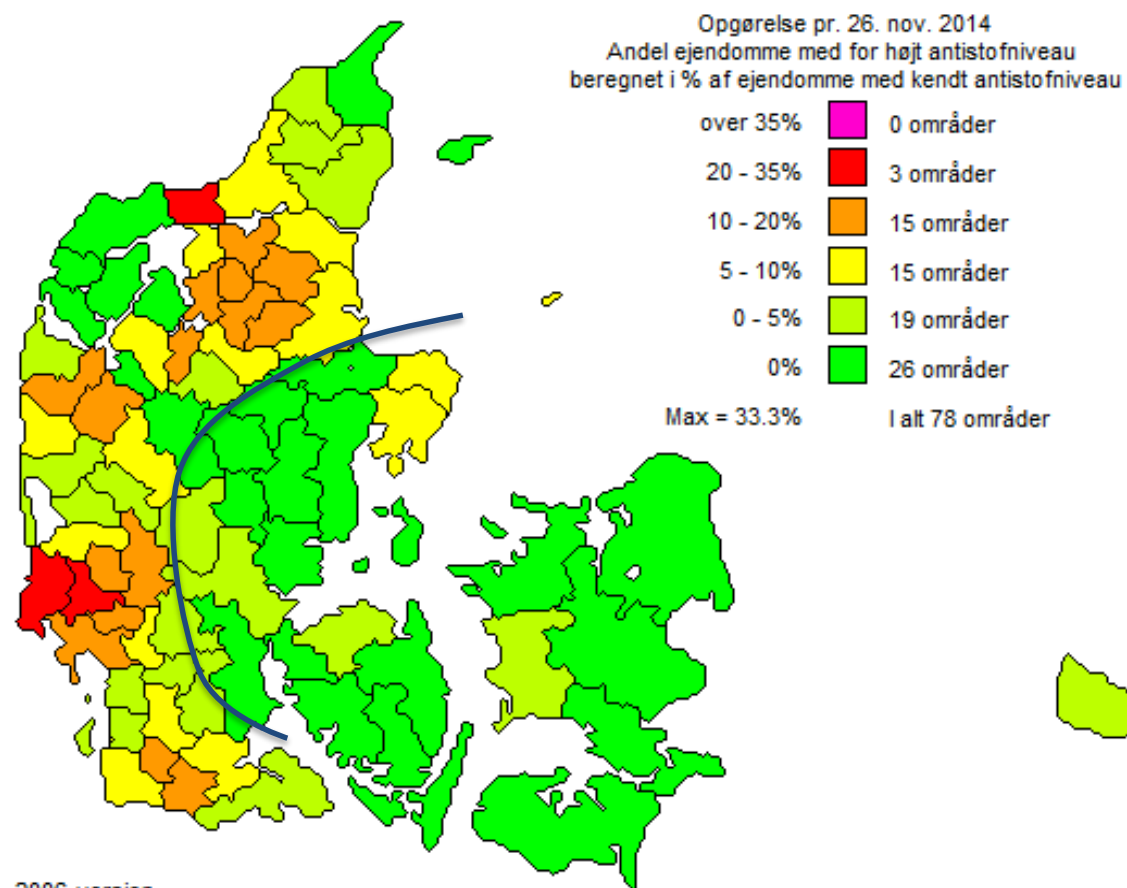
SEGES

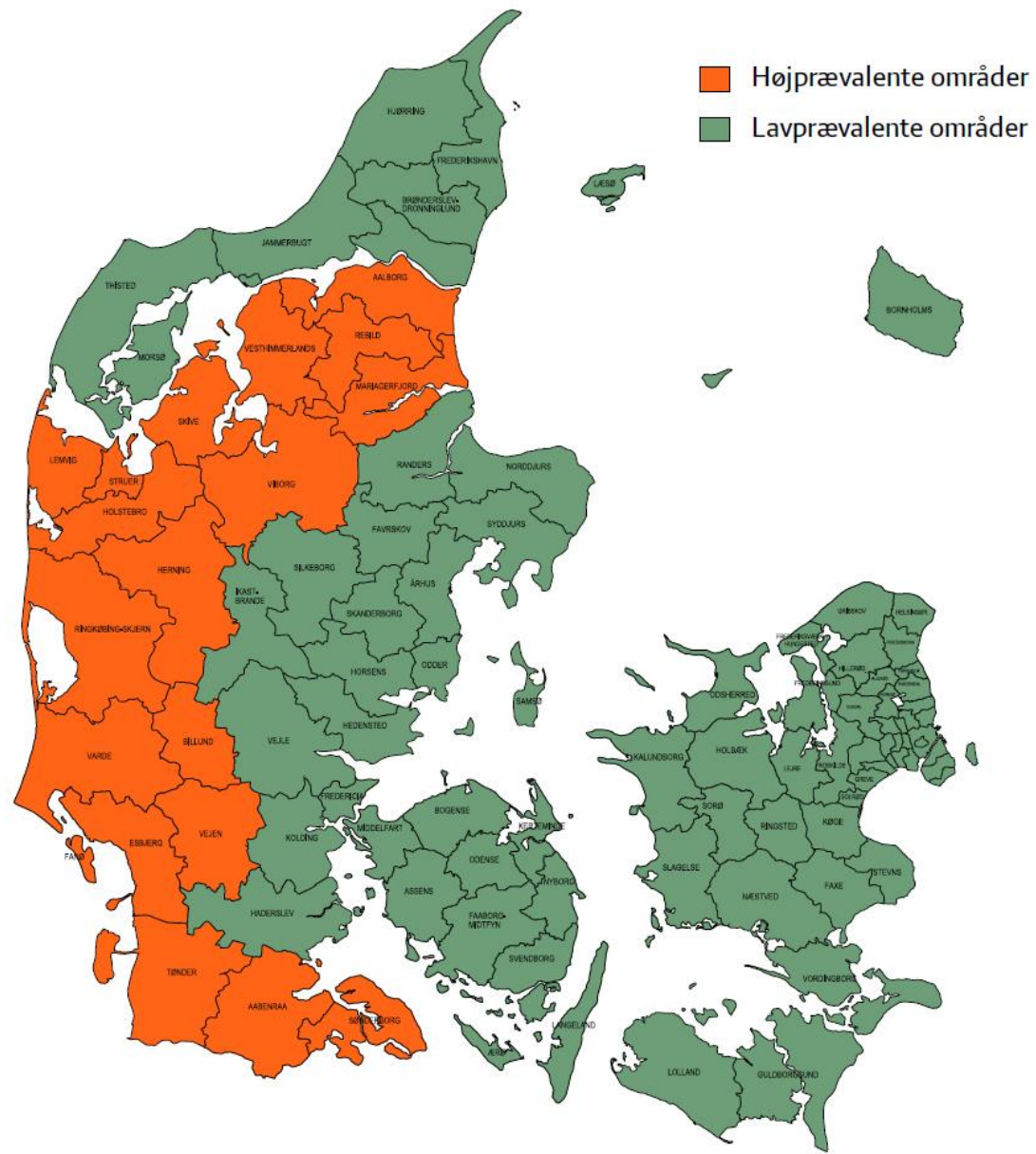


July 2014 – and again in 2015



Antistoffer - Salmonella Dublin Mælkeleverende ejendomme



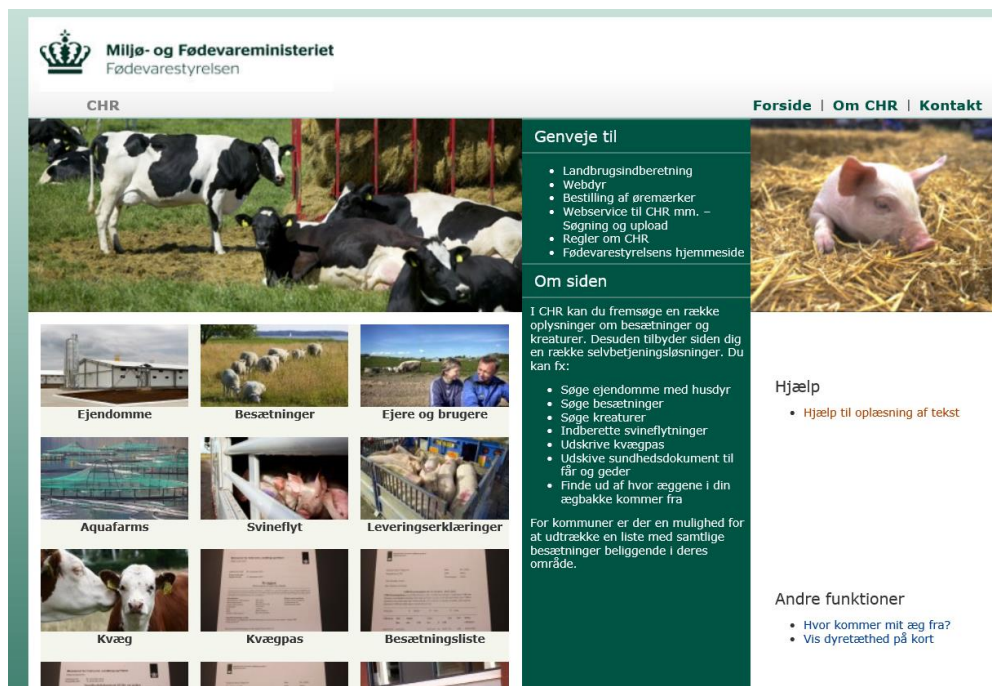


Regionalisation 2014-2018

- To protect herds in low-incidence areas:
 - Ban on movement of animals from high-incidence country parts to low-incidence areas, except:
 - Male calves from level 1 to rose calfproduction, animals attending animals fairs,
- Level 2 in low-prevalent areas is subject to restriction
- From 2019
 - Level 1 – free trading in all country
 - Level 2 – NO trading – only slaughter or export



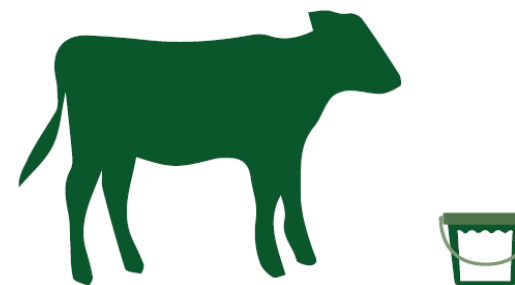
Salmonella program



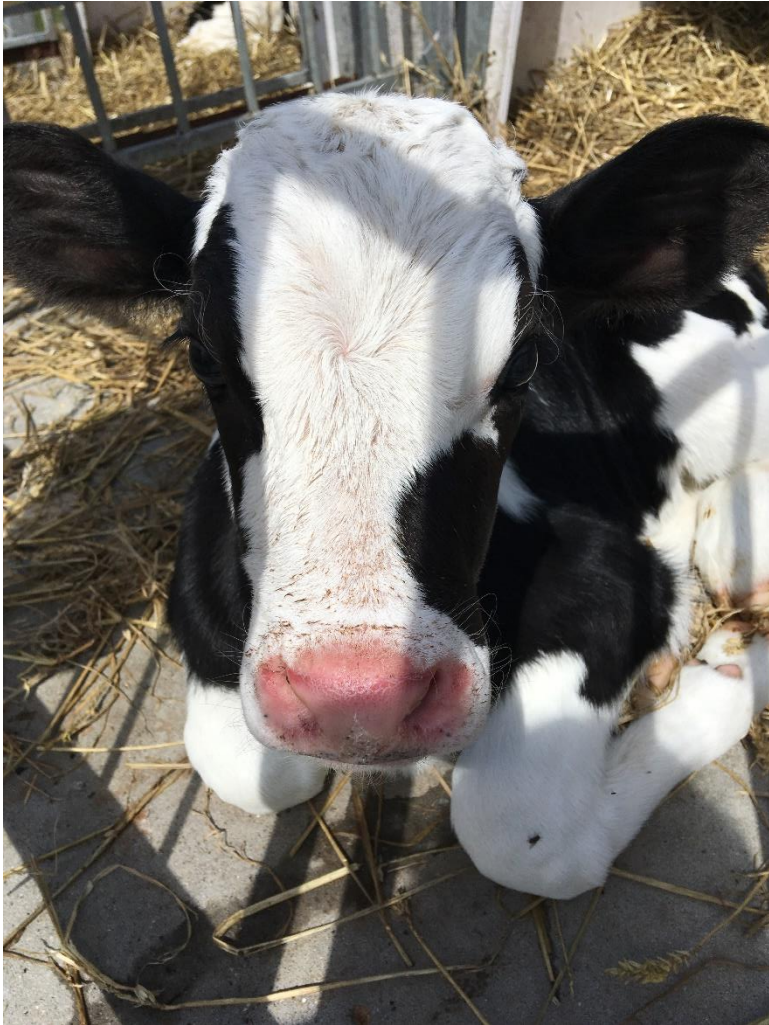
- Surveillance program with public access
- Movement restrictions and regionalization
- Mandatory eradications in infected herds – herd-specific systematic action-plans incl. Test strategies
- Later official restrictions in all test-positive herds

Mandatory control in the Level 2 Herds

- Prohibition on the sale of livestock, excluding animals for slaughter, and animals for export
- The herdowner shall, in cooperation with his veterinarian, prepare a herd-specific, active and time-limited action plan for the control of Salmonella Dublin
- The impact of the action plan shall be documented
 - Quarterly Blood tests of 8 calves older than 3 months and if positive
- Faeces and slurry/manure samples
- Public oversight of special slaughtering



Mandatory control in the Level 2 Herds



- Negative bacteriological tests:
 - Adjustment of the action plan needed
- Positive bacteriological tests:
 - The herd is set in Level 3 (with special slaughter)
 - Further restrictions applicable by the authorities

Important points about Salmonella Dublin in cattle

- Infection is associated with loss
- The more infection - the greater the loss
- Infection is controlled by hygiene and contact patterns
- Large herds = more animals, more susceptible animals and more animals excreting = less chance of accidentally getting rid of the infection
- Large herds are at higher risk of new infection due to potential purchase more stock

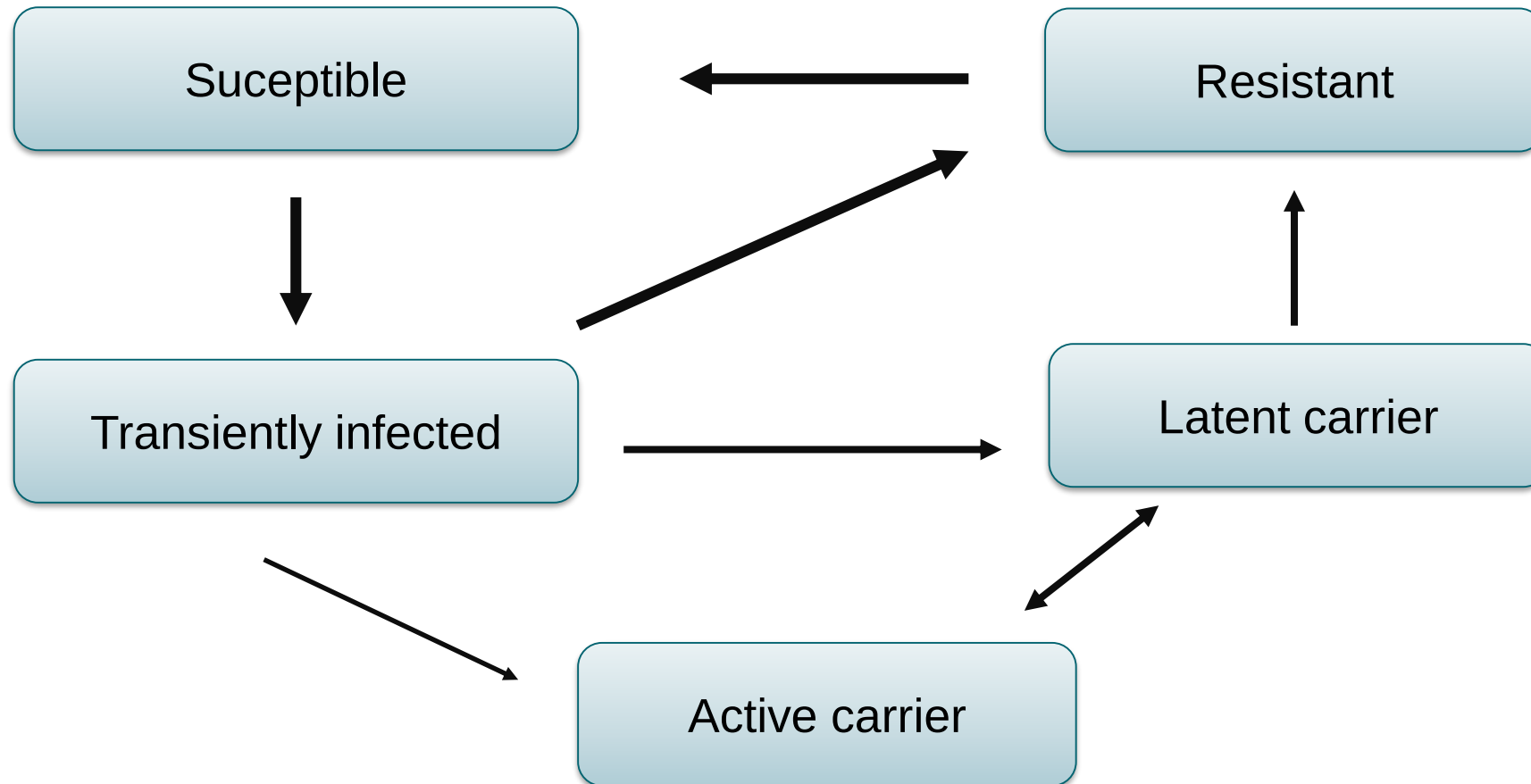


Salmonella Dublin Facts

- Salmonella Dublin is a bacteria that primarily infects cattle
- The bacteria spreads primarily with faeces
- Small doses of the bacteria leads to an increase in the antibody level in the animal
- Calves under 6 months are most susceptible, but animals of all ages can be infected
- Salmonellosis is difficult to treat with antibiotics
- Salmonella can survive for months or years in the environment



Infections stages

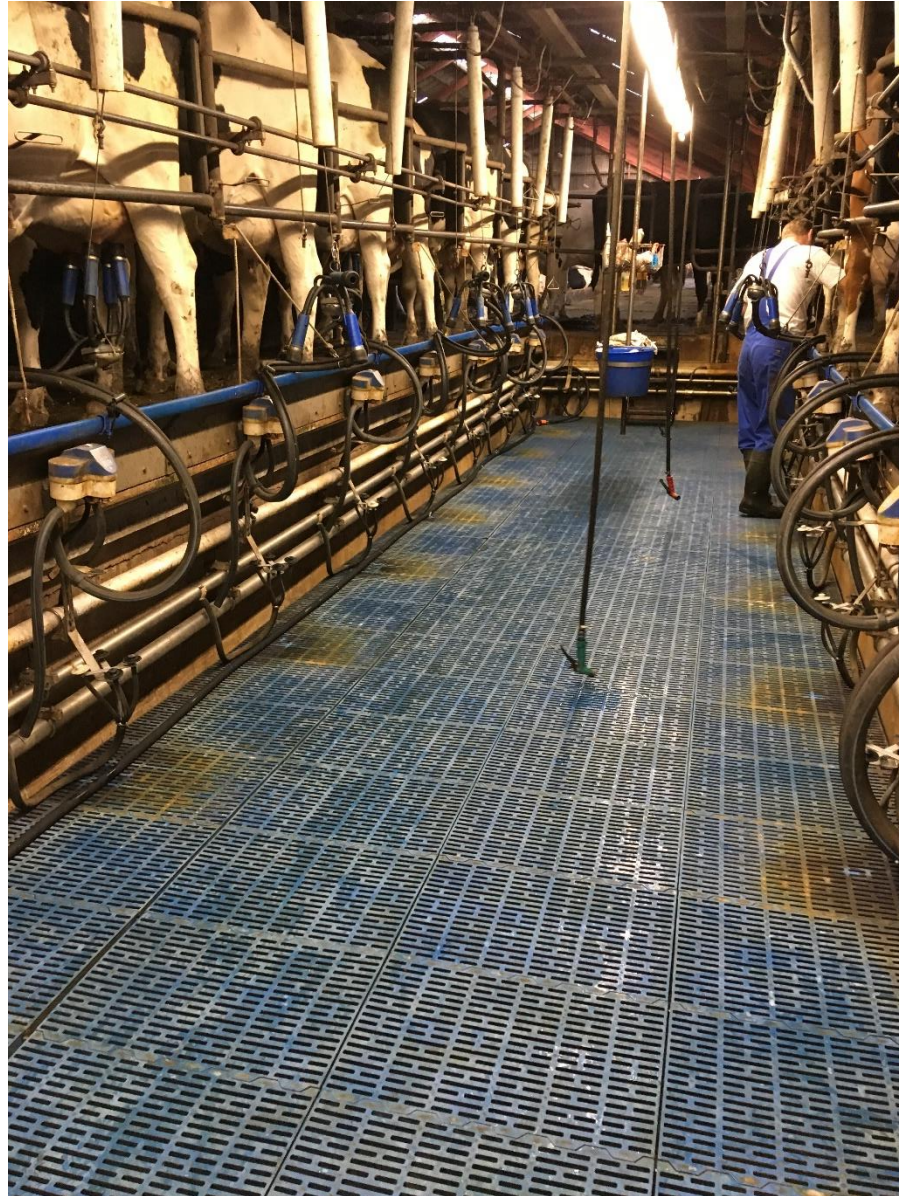


Clinical signs

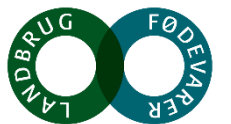
- Fever
- Diarrhoea (bloody)
- Pneumonia
- Arthritis
- Death
- Abortion(in utero infection)
- Rarely: necrosis on ear, tail and legs



Outbreak



SEGES



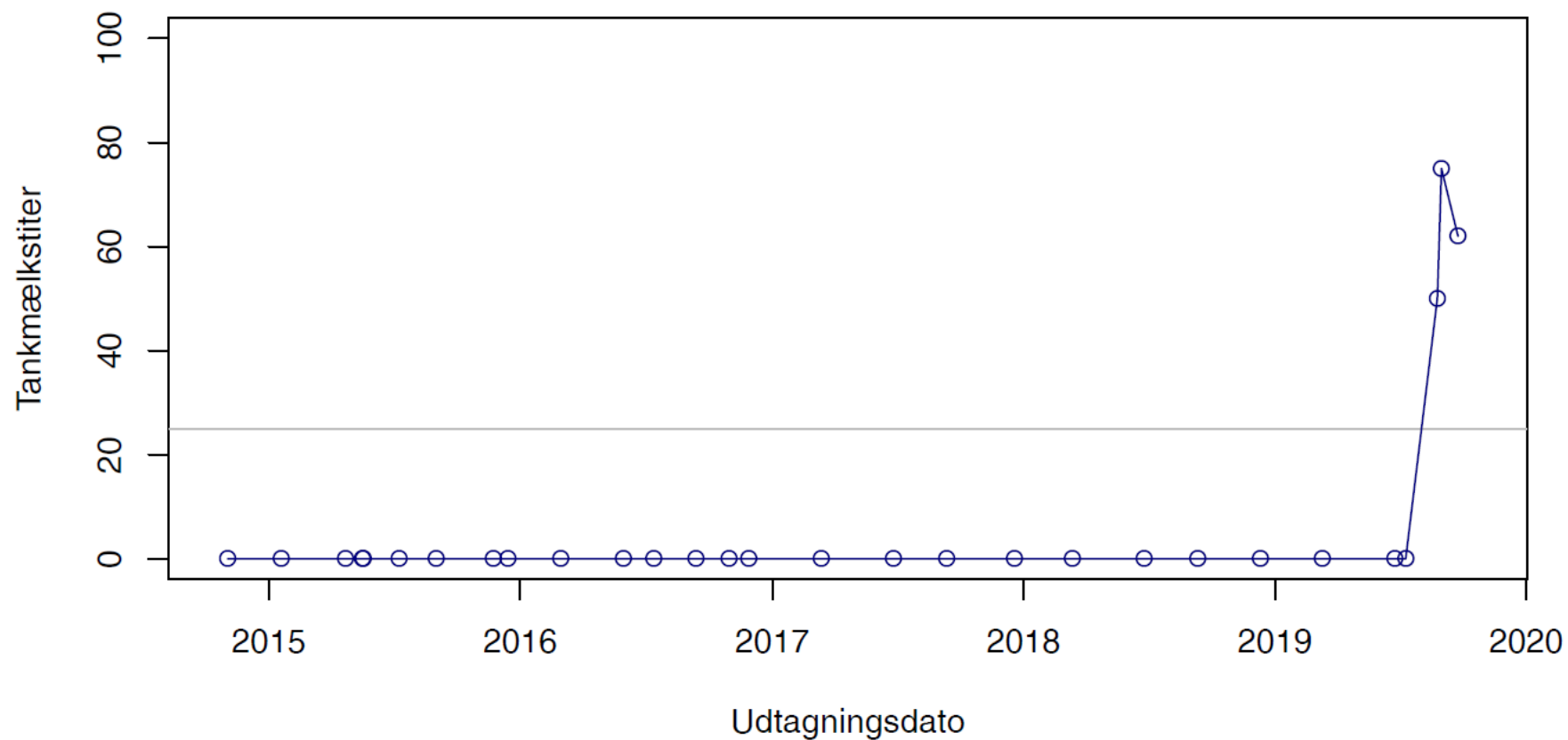
Outbreak

- High yield organic farm, 14.000 kg/pr cow, 210 cows
- The last 2 weeks in July
 - 5 abortions, high fever, different symptoms
 - Calf disease
- No test, no suspicion, no vet
- Test for Salmonella in bulk milk and animals in june because of cattle show
- Government?
- New bulk tank milk, called vet, aborted calf



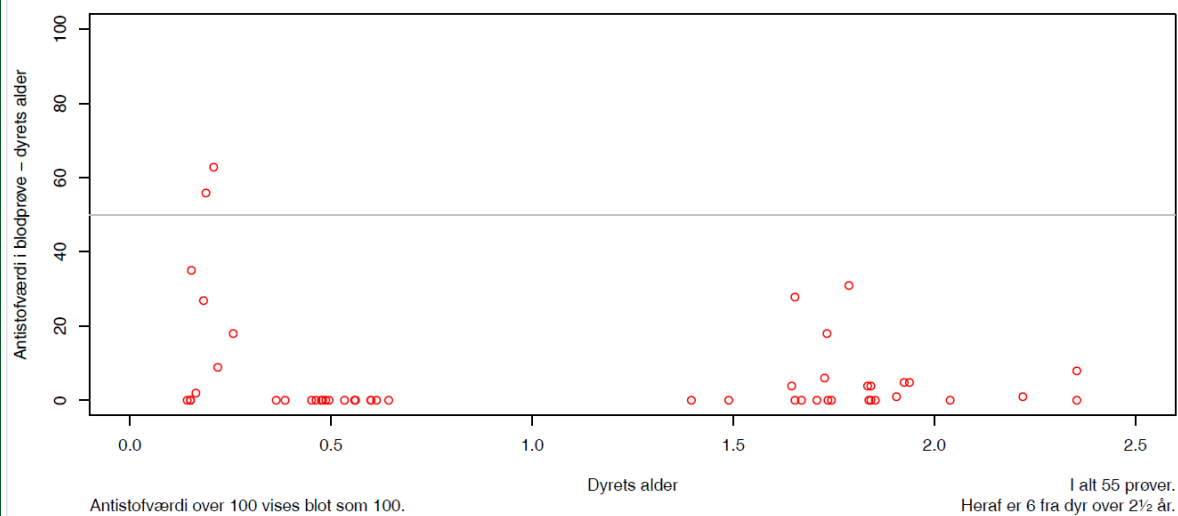
Outbreak

Tankmælkstitre for CHR-nr. [redacted]
de seneste 5 år

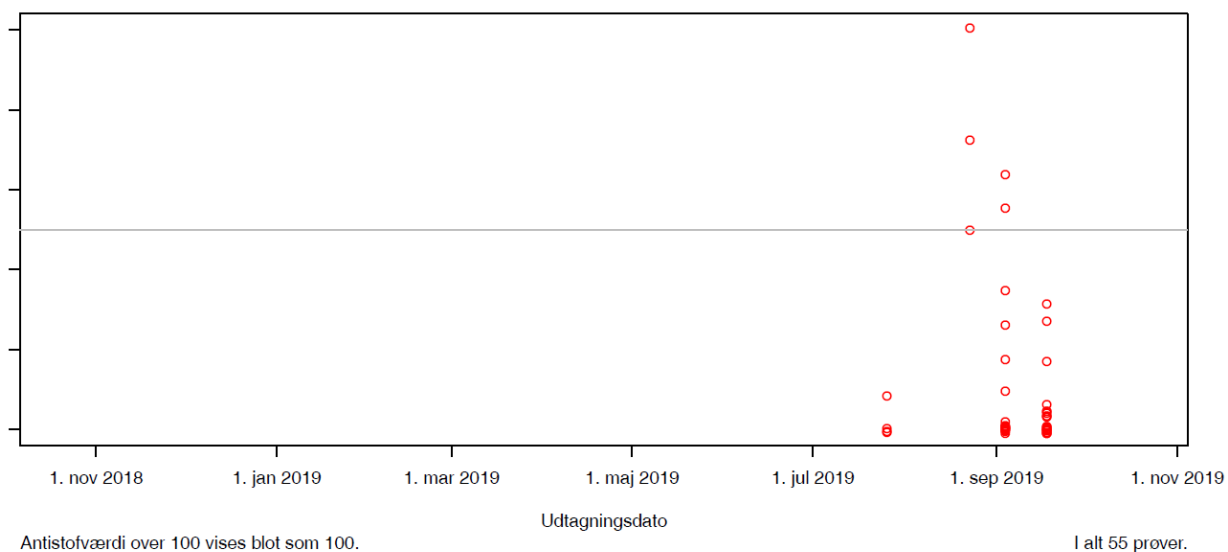


Blood samples

Antistofværdi i blodprøve – dyrets alder
1: 22-10-2018 til 21-10-2019

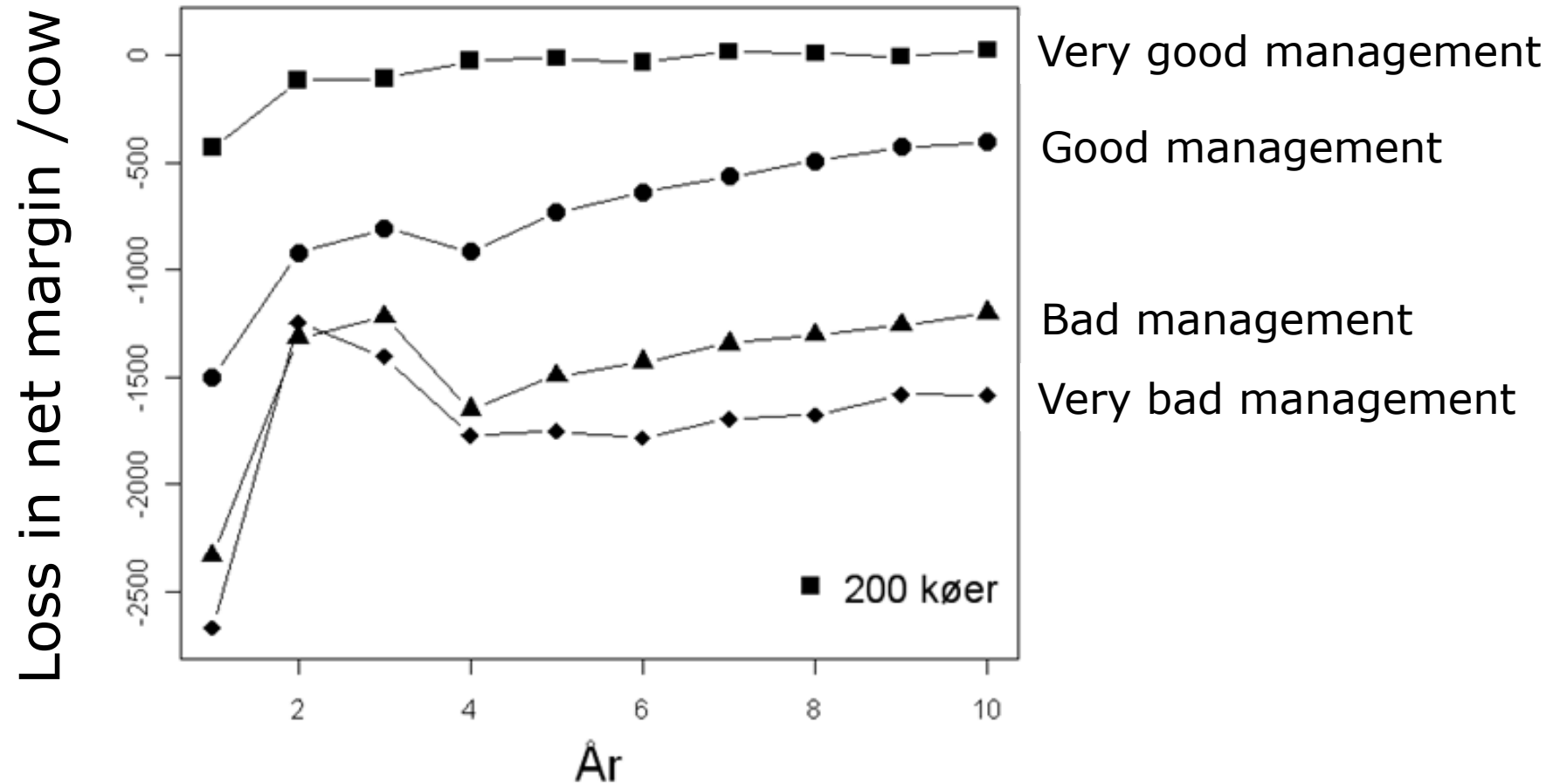


Antistofværdi i blodprøve – kalendertid
1: 22-10-2018 til 21-10-2019



Action for outbreak farm

The cost of salmonella?



Transmission routes

We only need a few grams of faeces with salmonella from another calf or cow to be infected with **Salmonella Dublin!**

Aerosoler



People



Calf housing



Calving pen



Carriers



Environment



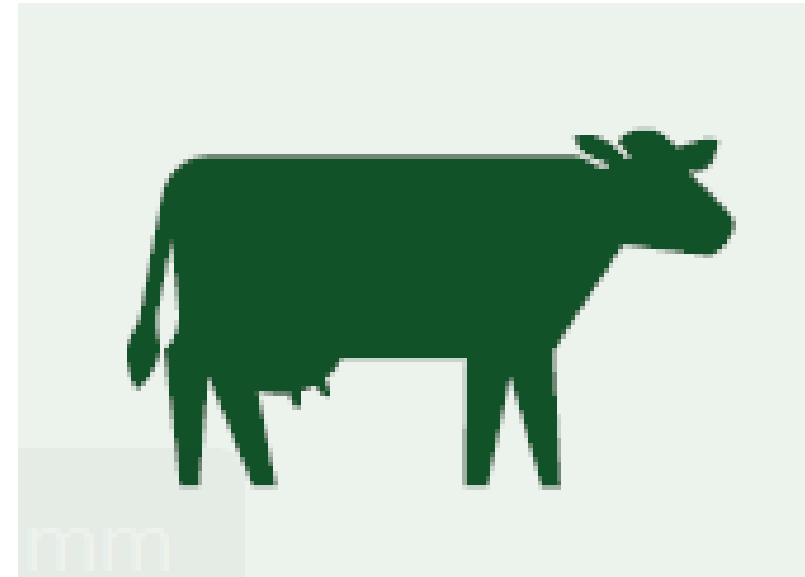
Possible Pathways - External

- Purchase of animals – twice as high a risk of becoming new-infected
- Direct infection
 - Ensure a good biosecurity plan (visitors, service personnel, machinery, collection of animals, driving routes, etc.) and observe the plan
- Indirect infection
 - Diffuse contamination from nearby properties – the closer the higher the risk
 - Passive transmission via rodent or pest



Important Pathways - Dairy cattle

- Calving area and management/stocking density
- Pens/huts for newborn calves
- The level of Hygiene
- Purchase of animals from level 2 herds
- Herd size



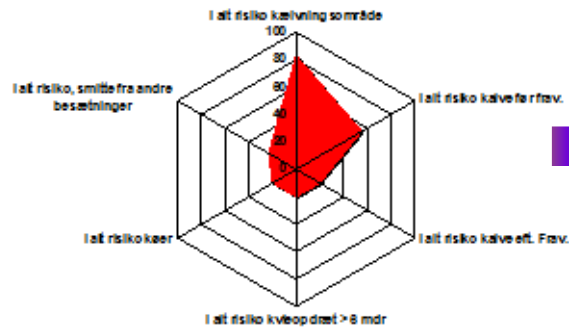
Eradication of Salmonella in a dairy herd



- A risk assessment of possible pathways
 - Externally and internally
- Get advice from advisors and veterinarians regarding the biosecurity
- Be systematic and look critically at farm routines
- Have requirements – for anyone with access and working within the farm and inform about biosecurity procedure at the farm

Systematic, step-by-step method

Find possible pathways



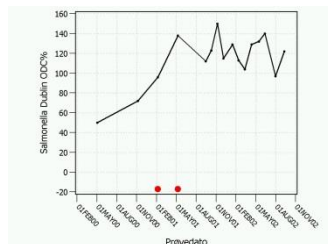
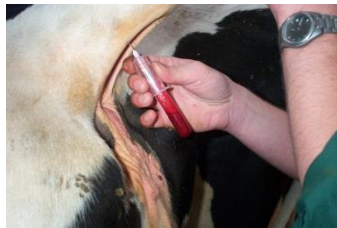
Make an actionplan



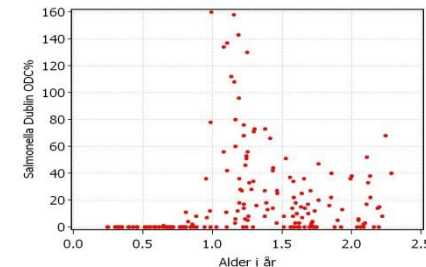
Make changes



Use and analyse lab.results

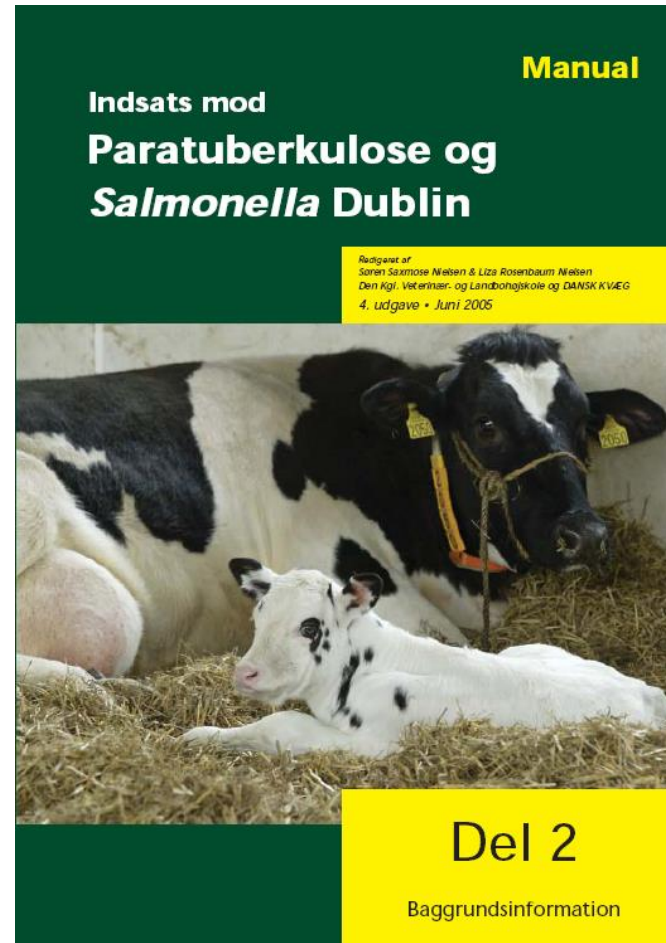
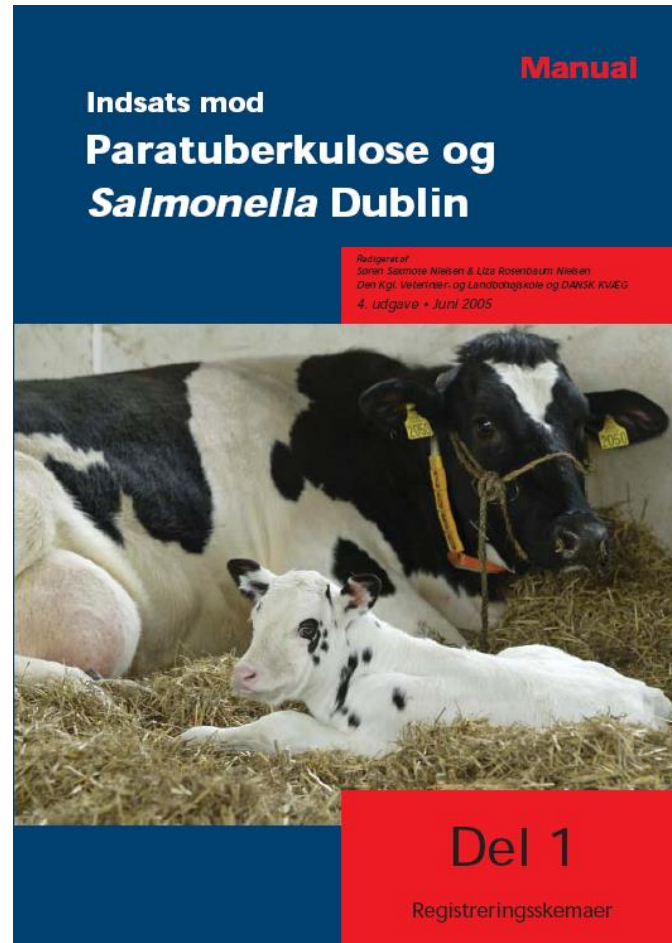


Evaluate the development in different groups



Manual for Advisor

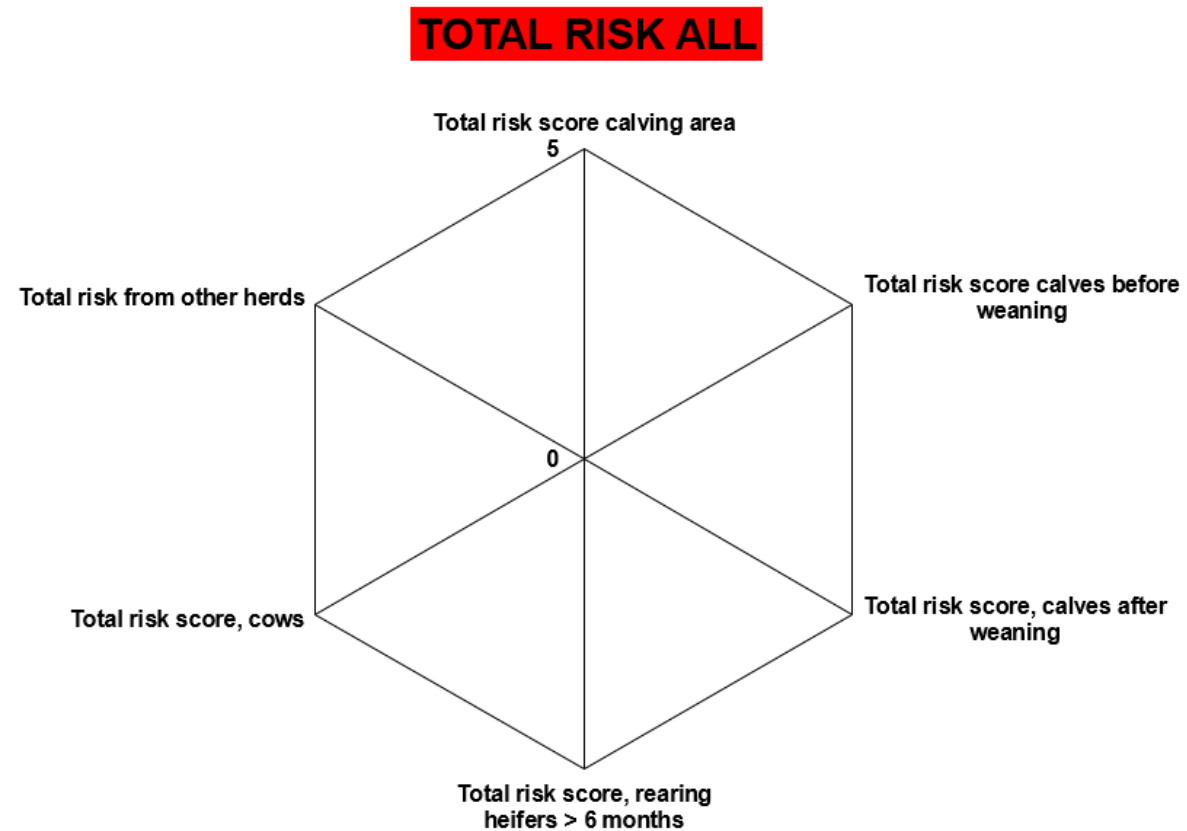
SEGES



Risk scoring forms - Salmonella

Calving area	1.1 Many cows in the calving area	0	0	Never
			5	Occurs rarely, and only when cows are considered low-risk cows based on serological tests
			15	Occurs frequently, but only when cows are considered low-risk cows based on serological tests
			20	Occurs rarely, but regardless of cows' test status
			25	Occurs in about half of the calvings, regardless of the cows' test status
			30	Occurs all the time, regardless of cows' test status
	1.2 Contamination of calving area with manure	0	0	Never
			6	Manure is removed on a daily basis. Only small amounts of manure are visible
			10	Cleaning 1-2 times per week. Only a small part of the area is contaminated with manure
			14	Cleaning 1-2 times per month. Most of the area is contaminated with manure
			20	Cleaning less than once per month. Extensive manure contamination of the area
	1.3 Sick cows in the calving area	0	0	Not used for sick cows
			5	Used for cows with hoof and leg disorders
			10	Used for cows suspected of suffering from ketosis, milk fever or the like
			10	Used for cows that appear weak, but have not been diagnosed
			15	Used for cows with gastrointestinal disorders other than salmonellosis
			20	Used for cows suspected of suffering from salmonellosis
	1.4 Amount of time newborn calves stay with their mothers	0	0	Always removed from the mother less than one hour after birth
			4	Always removed from the mother less than 6 hours after birth and is only housed together with low-risk cows
			6	Removed from the mother more than 6 hours after birth in 1-5 out of 10 calvings and is only housed with low-risk cows
			12	Removed from the mother more than 6 hours after birth in more than half of the cases, but is only housed with low-risk cows
			15	Removed from the mother more than 6 hours after birth in 1-5 out of 10 calvings, and has been housed together with high-risk cows or cows of unknown status
			20	Removed from the mother more than 6 hours after birth in 1-5 out of 10 calvings, and has been housed together with high-risk cows or cows of unknown status

Risk Scoring – finding most important transmission routes



Movies

- <https://player.vimeo.com/video/146228968>
- <https://vimeo.com/196829595>
- <https://player.vimeo.com/video/152979416>



Brug sæbe og opnå stor effekt af rengøringen

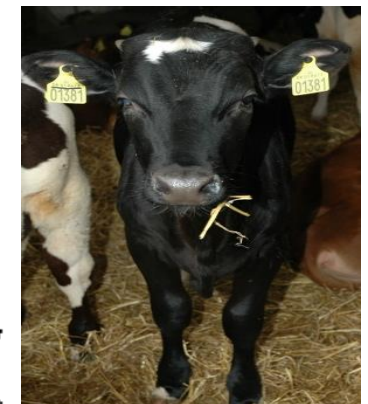
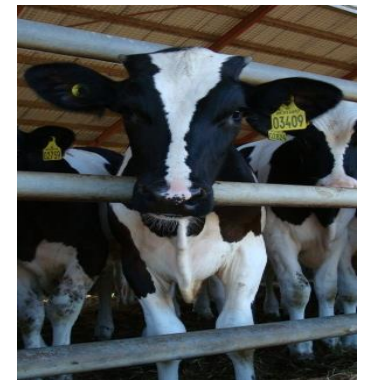
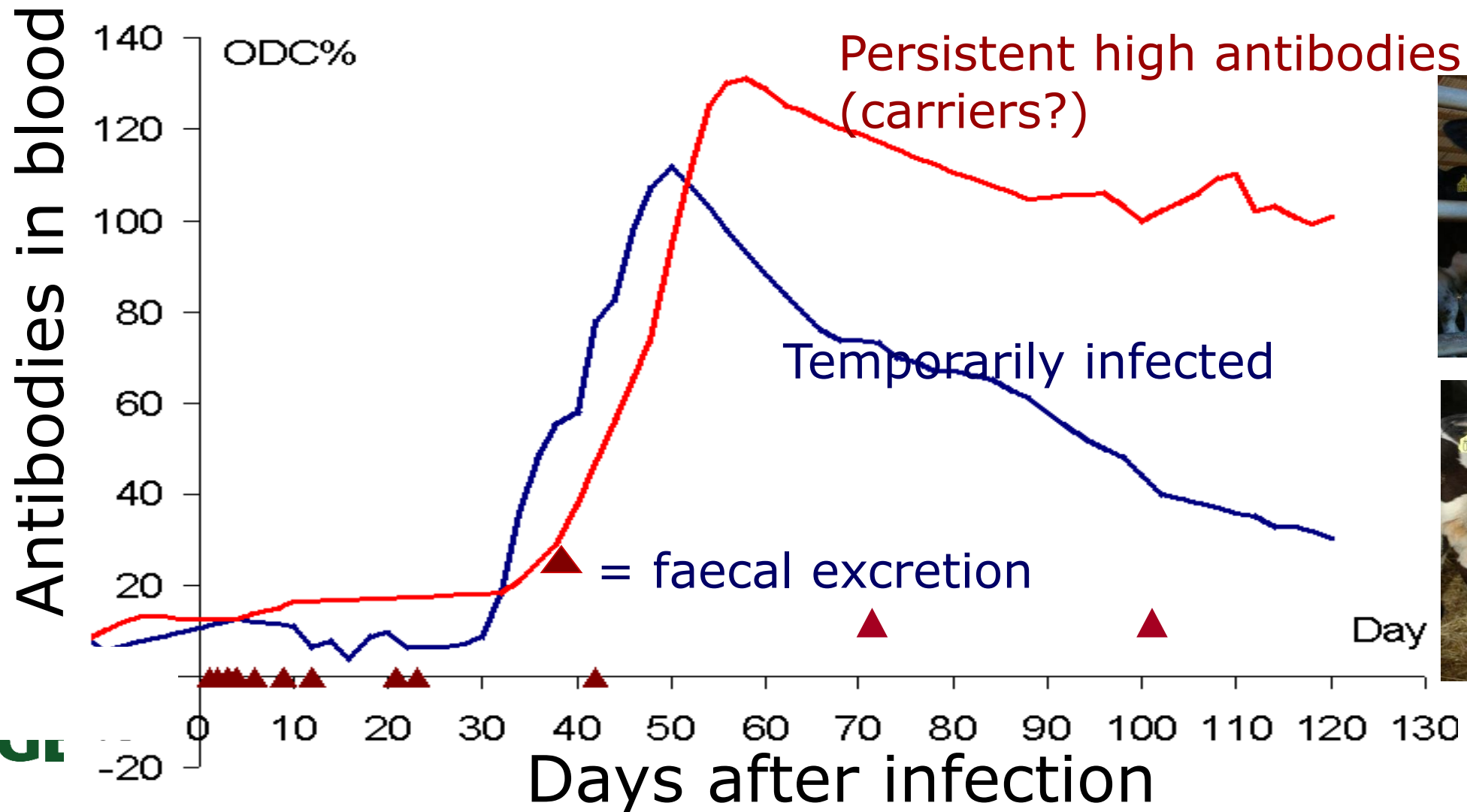
SEGE

DESINFEKTION: Brug sæbe ved rengøring. Det er en lille merindsats, som ikke koster meget i tid og penge. Effekten er til gengæld stor og af afgørende betydning for, om udstyr bliver rent.

falderaktive stoffer), der 'bygger bro' mellem vaskevand og fedtstofferne, så skidtet forbliver pakket ind i vaskevandet. Derved fjerner sæben alt organisk materiale. Er der ikke gjort noget med sæben først, er det næsten

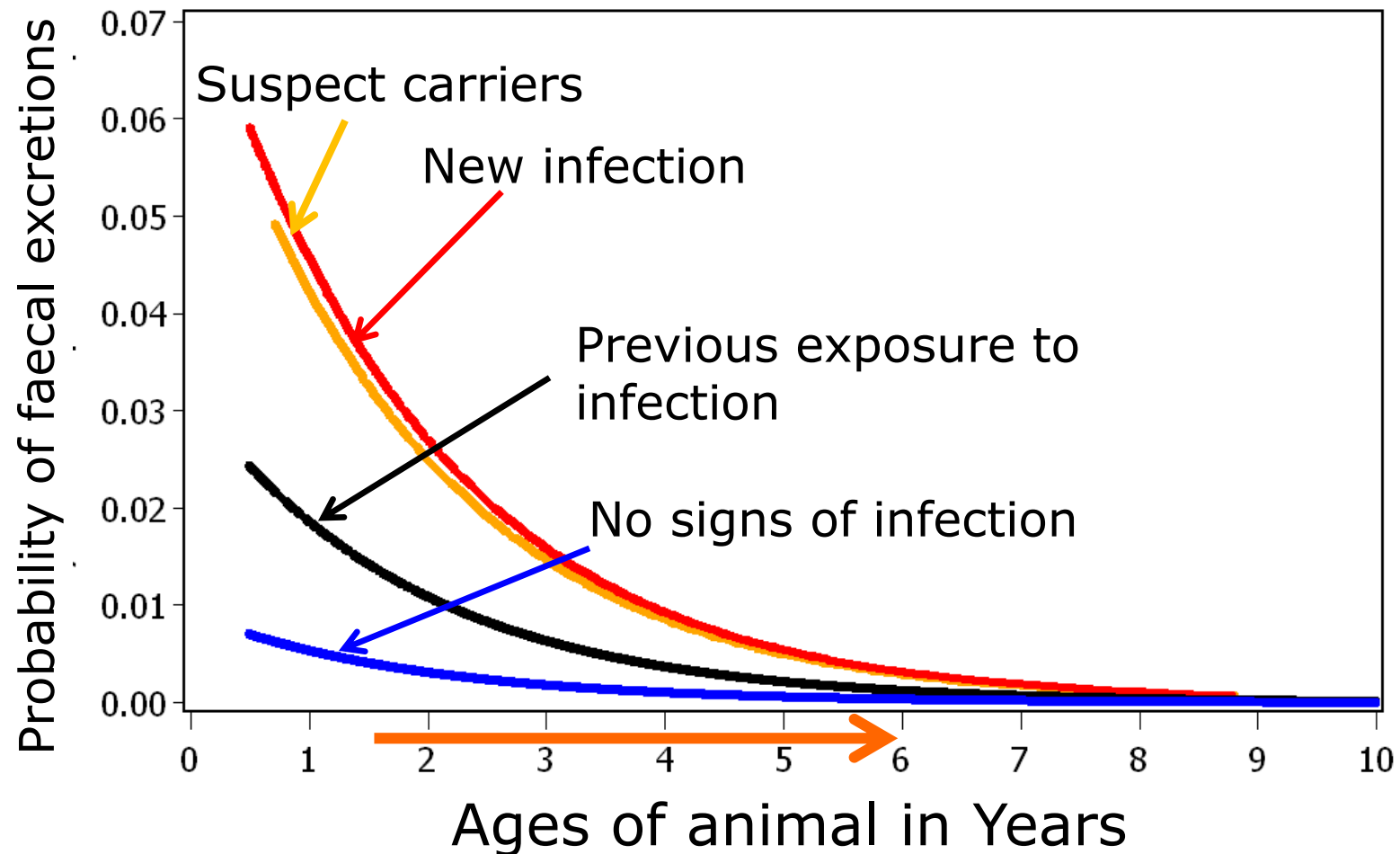


Faecal excretions and antibody response in 2 calves infected when they are 2 months old

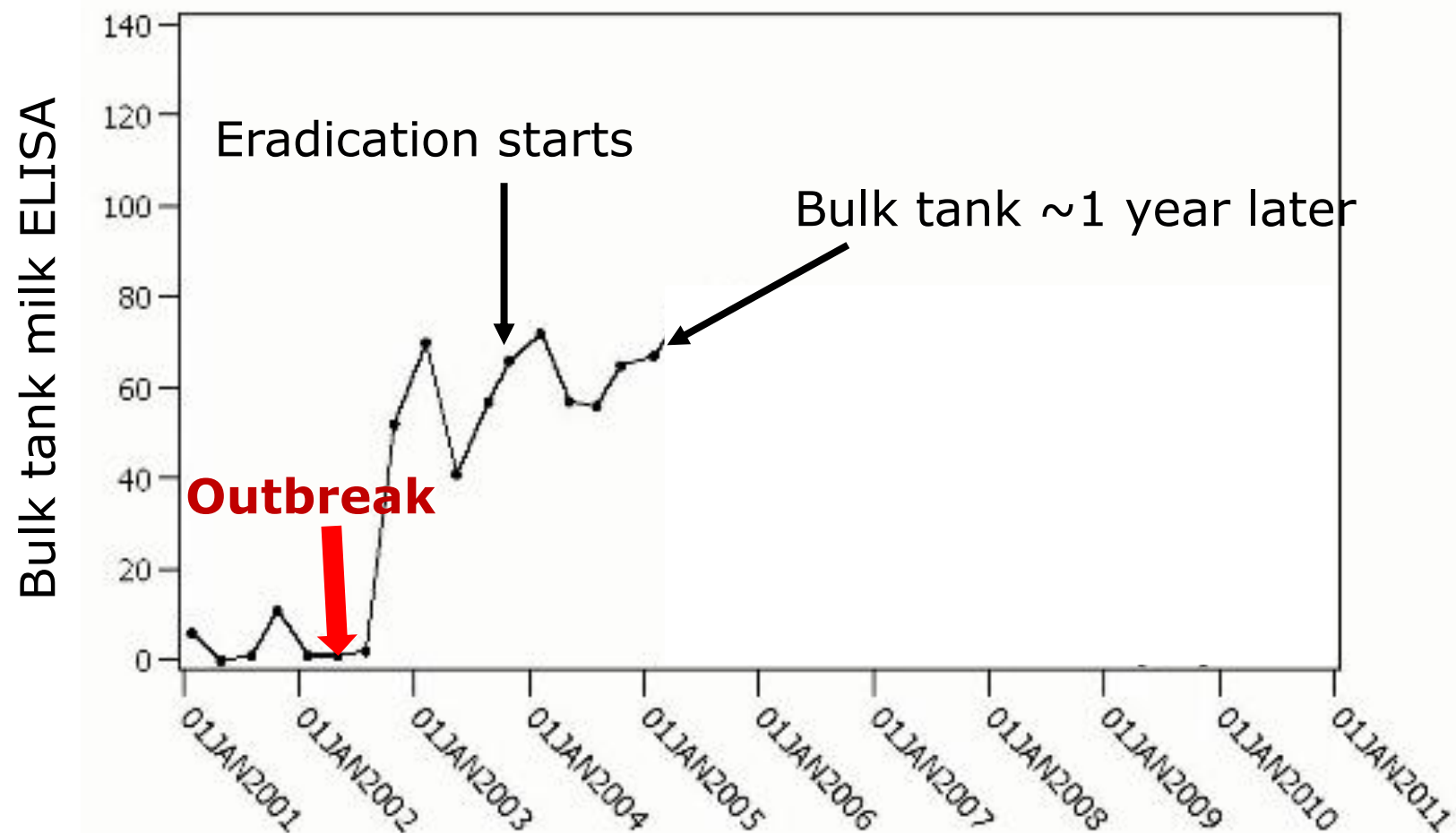


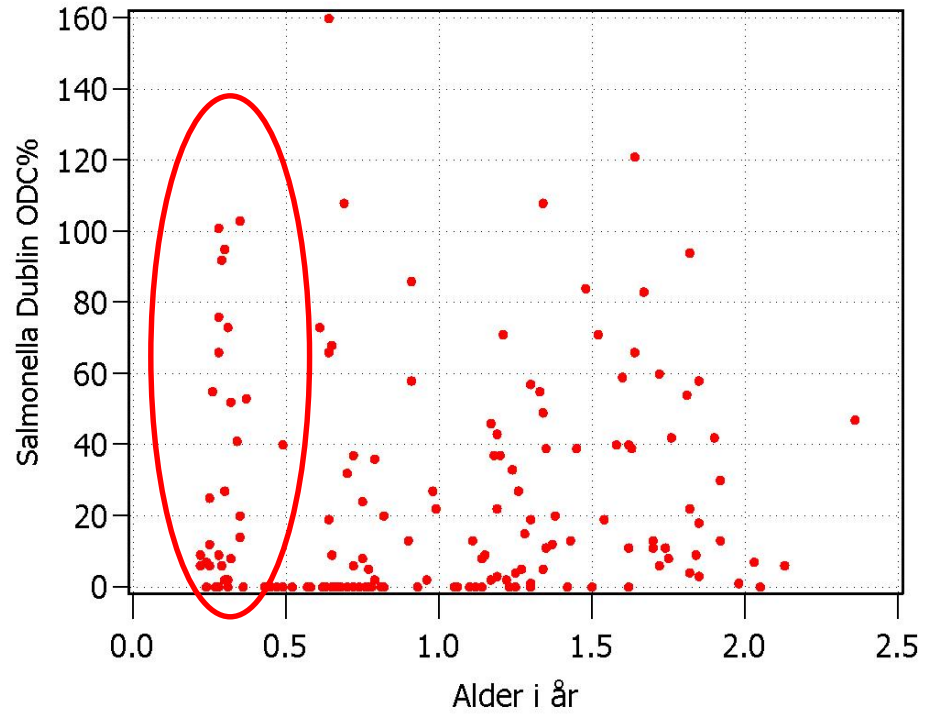
What are we supposed to do with animal having persistently high antibody response for Salmonella Dublin?

Dia
s 45



Bulk tank – development after outbreak and continuous shedding



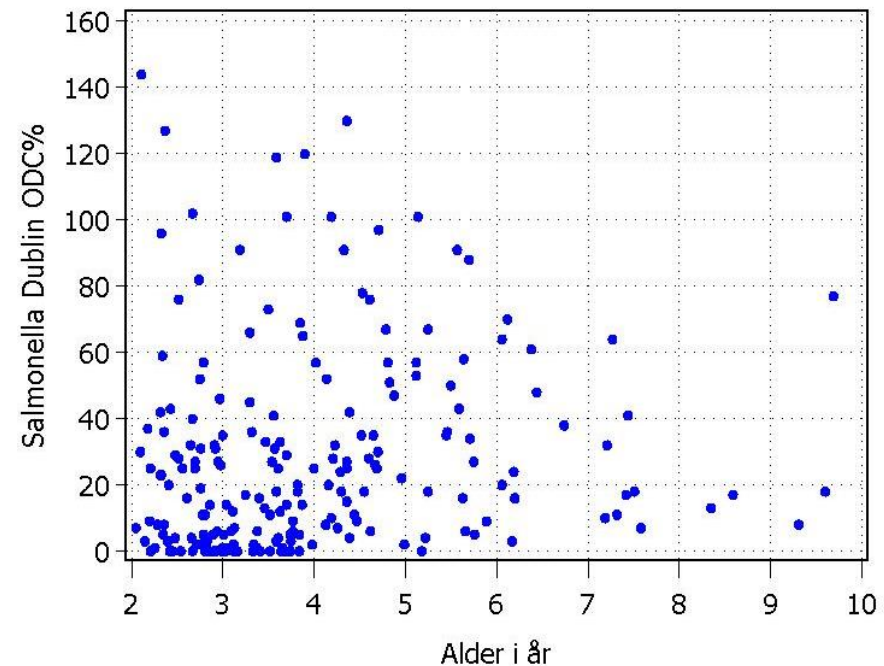


Massive shedding in the herd

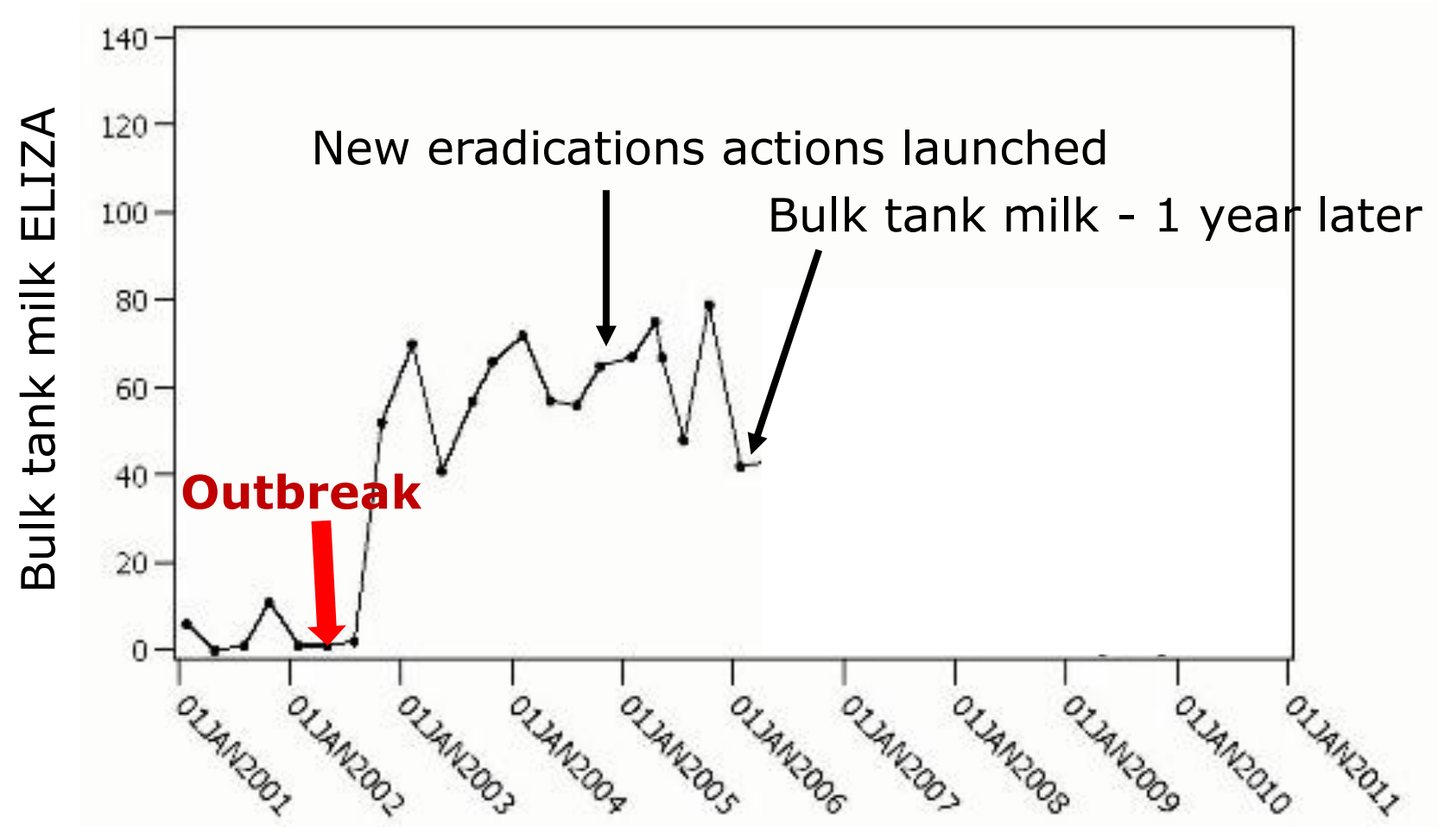
Focus on the young calves

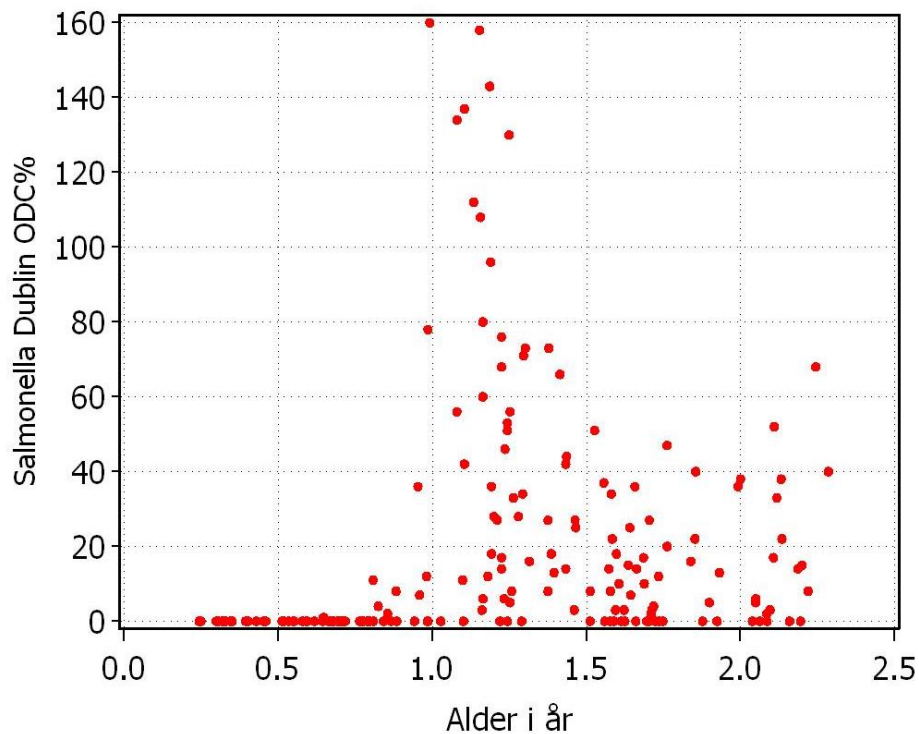
← Young stock – blood samples

Cows
- milk samples
→ Many cows with high antibody



Bulk tank – development after outbreak and stop of spreading

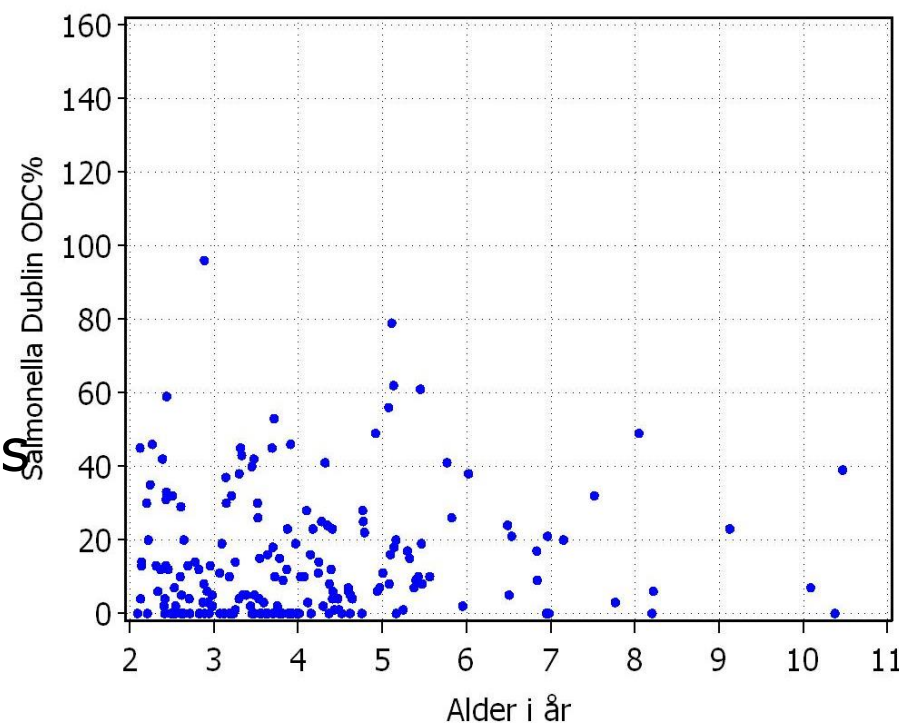




1 year after eradication actions launched - working

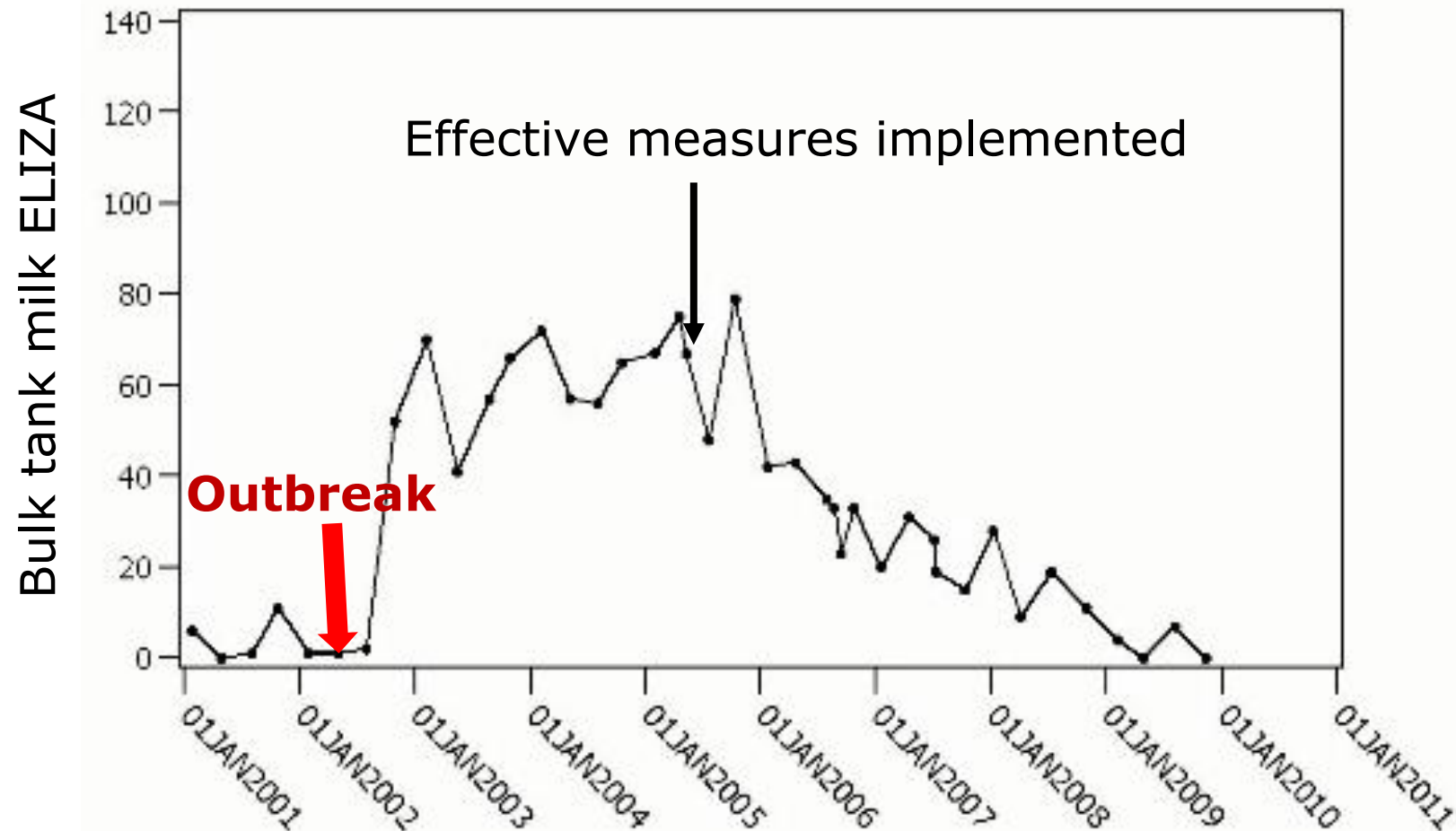
← Young stock – blood samples

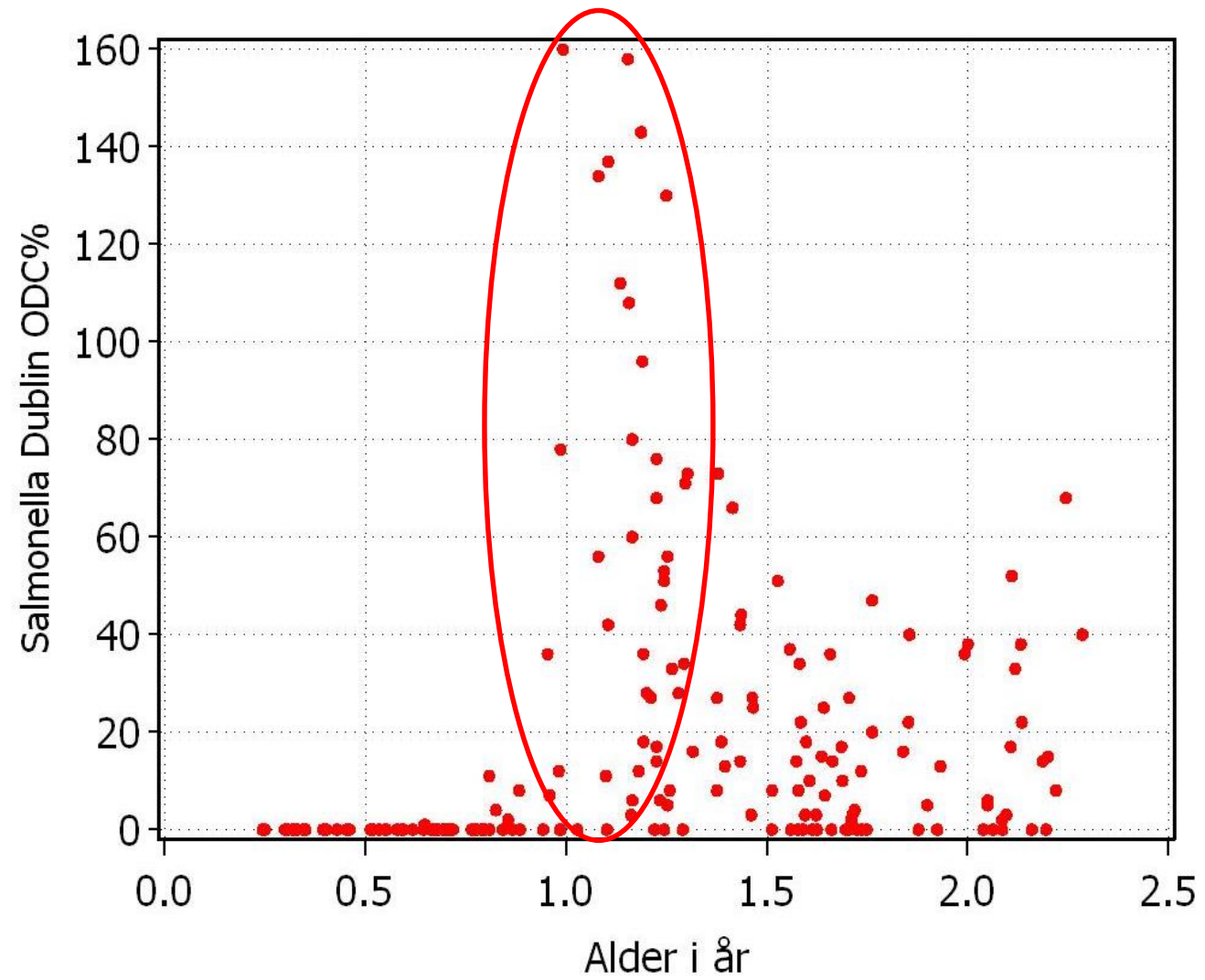
Cows – milk samples →
Few cows with high antibodies



Bulk tank – development after outbreak and stop of spreading

09-01-2020 50





Why young stock is important

- Greater risk of heifers infected between the age of 12-24 months of becoming carriers as well as cows around calving
- Animals with persistently high antibody profile – a few% of these pose a risk of excreting bacteria
- Highest risk is found in animals below 2 years of age
- The animals do excrete more frequent, the younger they are

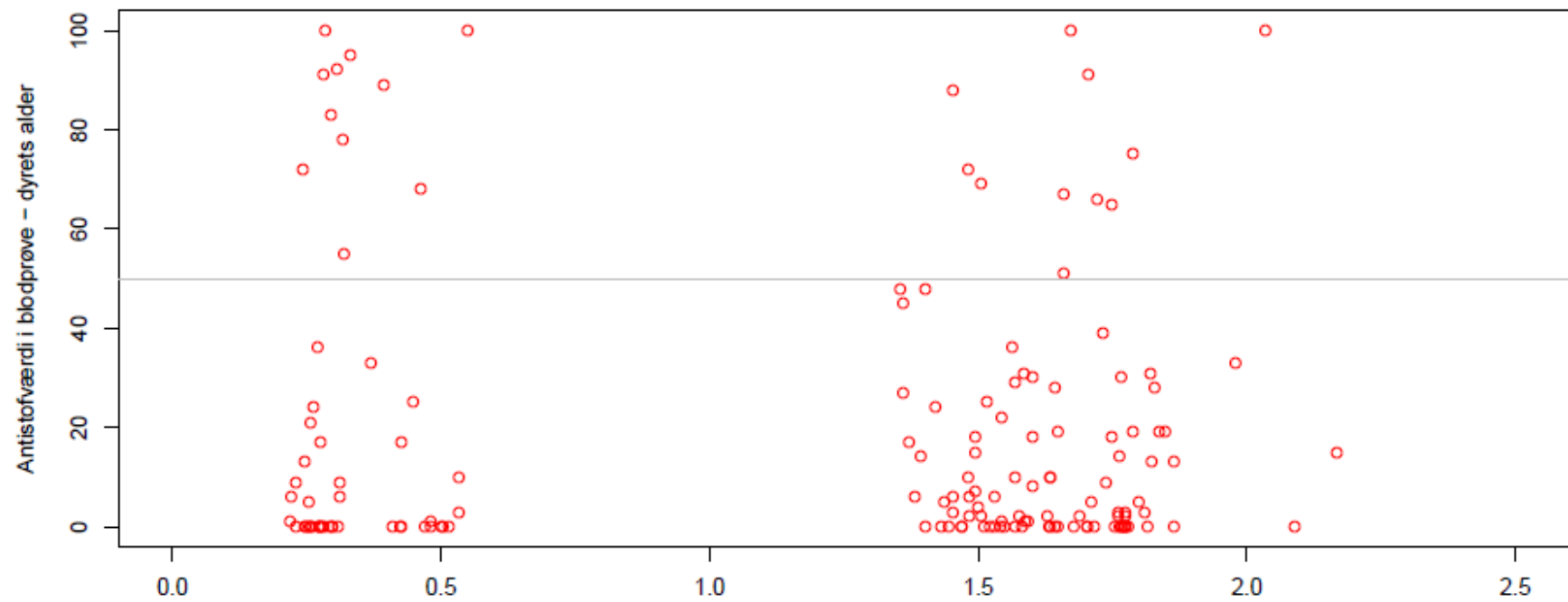


Tests

- In general, the perception is that if the calves are free-then the young stock are also - NO
- Most farms test primarily as the legislation prescribes – 8 calves are tested every 3. Month (blood tests)
- The sample size can be small or large – depends on the number of animals
- Few farms testes young animals – many test cows at individual level
- What happens from 3 months of age to when they calves?

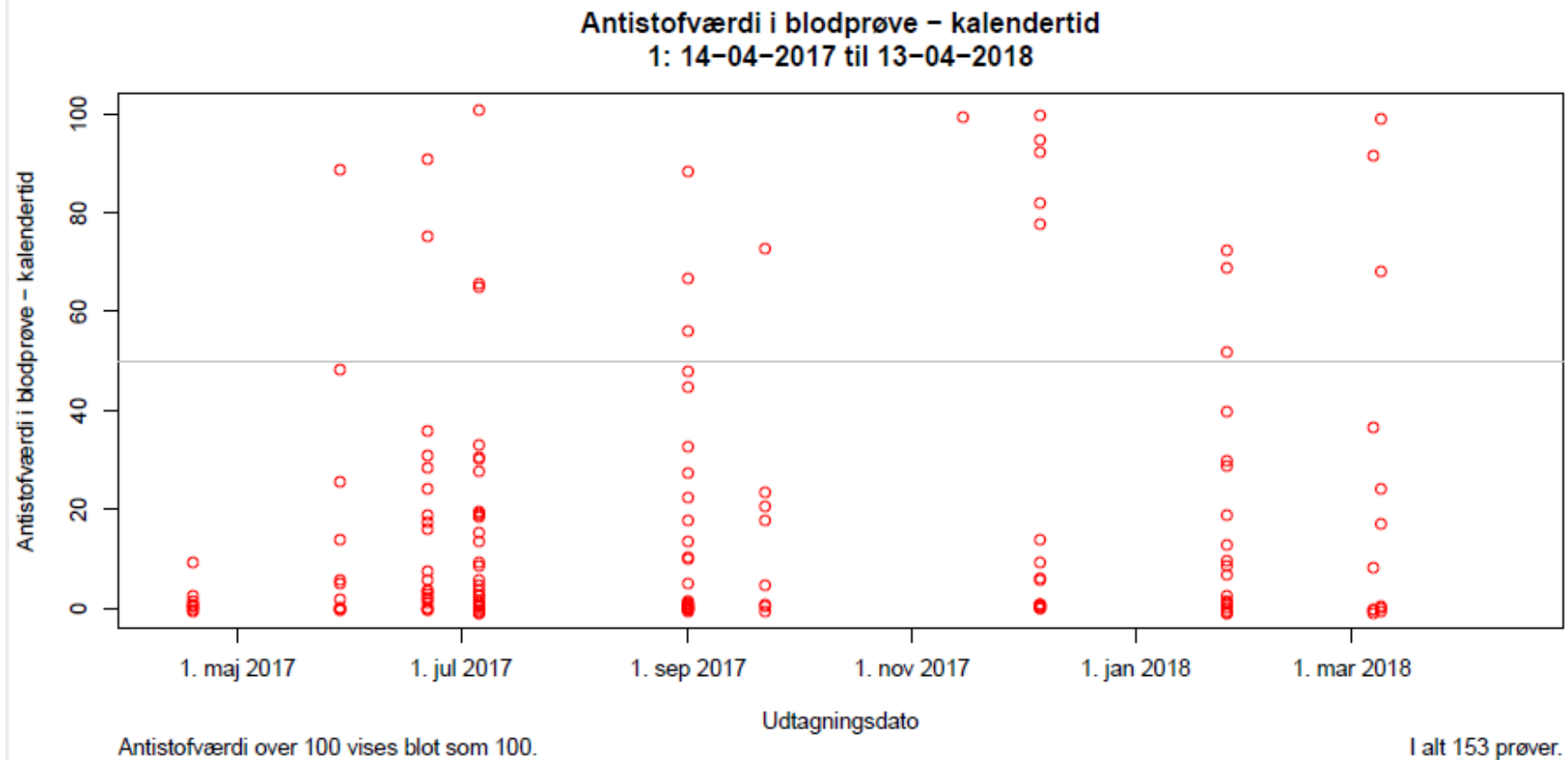


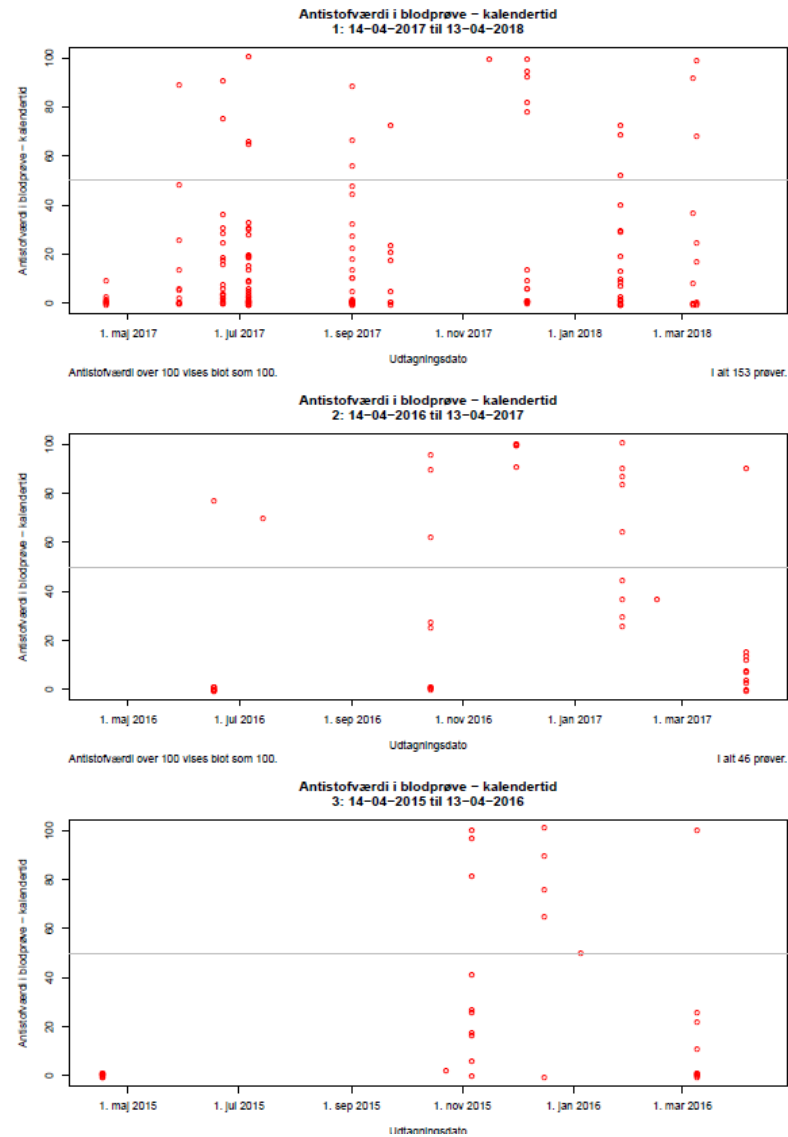
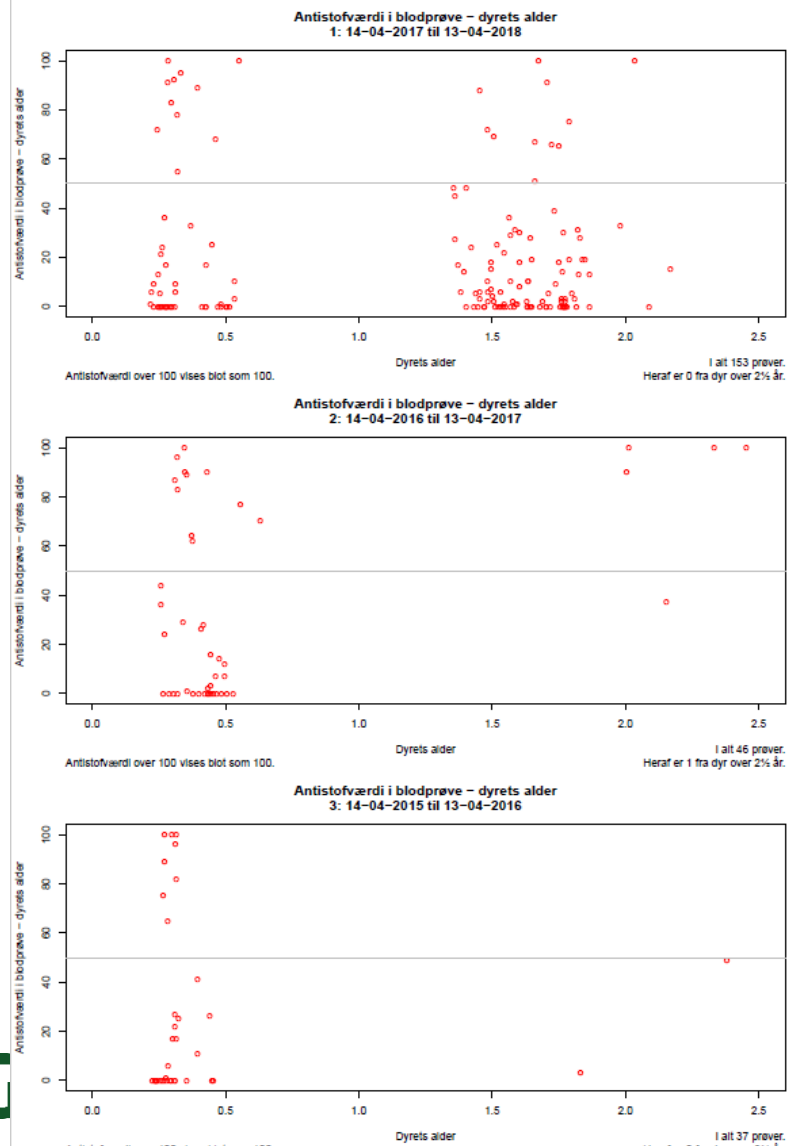
Antistofværdi i blodprøve – dyrets alder
1: 14-04-2017 til 13-04-2018



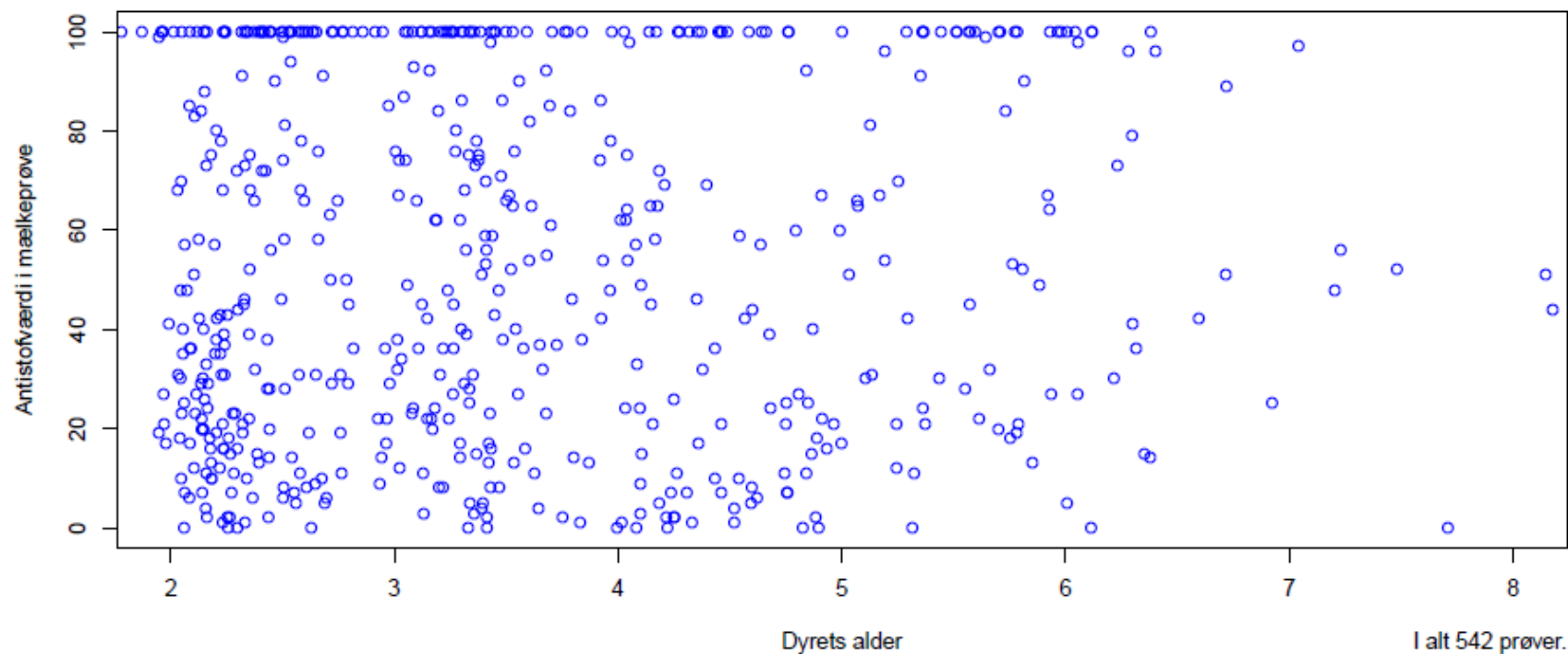
Antistofværdi over 100 vises blot som 100.

I alt 153 prøver.
Heraf er 0 fra dyr over 2½ år.





Antistofværdi i mælkeprøve 1: 01-03-2017 til 28-02-2018



Antistofværdi over 100 vises blot som 100.

I alt 542 prøver.
Heraf er 2 fra dyr over 8 år.

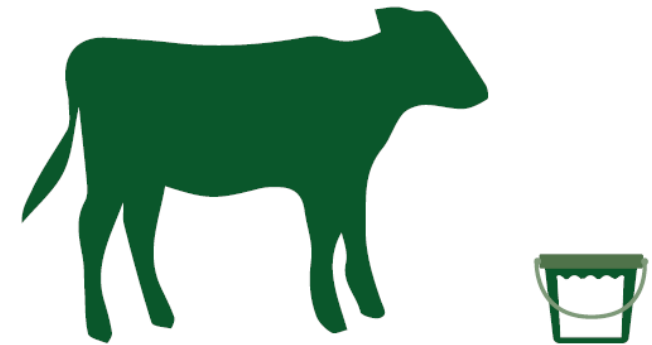
Visiting a herd with positive calves

- Barn Review – follows the path of the calf
- Calving pen – procedure, hygiene, looking at the cows (cleanliness)
- Duration The calf is in the calving pen – procedures, transportation out of the pen, transportation to calf box/hut, dirty calves, log – asking a lot of questions
- Housing of the newborn calves – procedure for cleaning, boxes/huts construction, pathways, duration, other transport in the area
- Feeding of calves – colostrum, milk feeding, hygiene, testing the procedures
- Moving calves to joint housing
- Joint housing – stocking density, hygiene



Calves

- Colostrum allocation
- Calves in clean boxes/huts (2 and 2 together)
- Effective cleaning/disinfection of boxes and bowls
 - Wash with alkaline soap
 - Disinfection with effective disinfectant
- Distance between boxes/huts
- Solid partitions



Cleaning – how and what to use



Cleaning - procedure



Colostrum - procedure

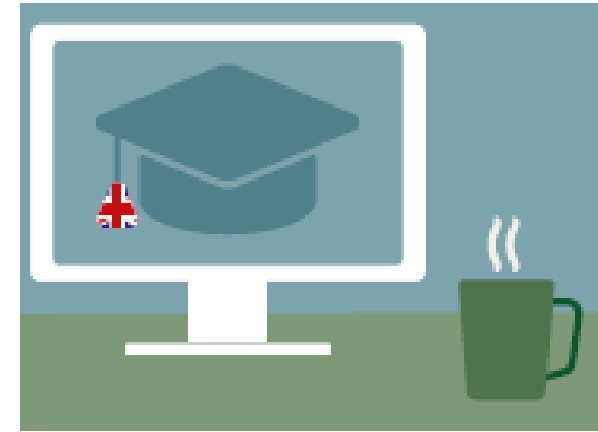




17 slides with fotos – but not for public use

Management that works against Salmonella Dublin in dairy cattle

- NO PURCHASE of infected animals!!!
- Calving pen – hygiene and handling
 - Prevent the cows calving on the concrete
- Caring for the newborn calf
 - Calf Housing and hygiene
 - Solid partitions/distance between calves 2x2
- Good hygiene in all barn sections – even within cows!
- Boot wash, hygienic feeding facilities, water troughs – Beware of water and high-pressure washer – also In the robots)
- Follow up with Min. 8 calf samples at regular intervals!
- Keep track of development among cows with bulk milk samples.



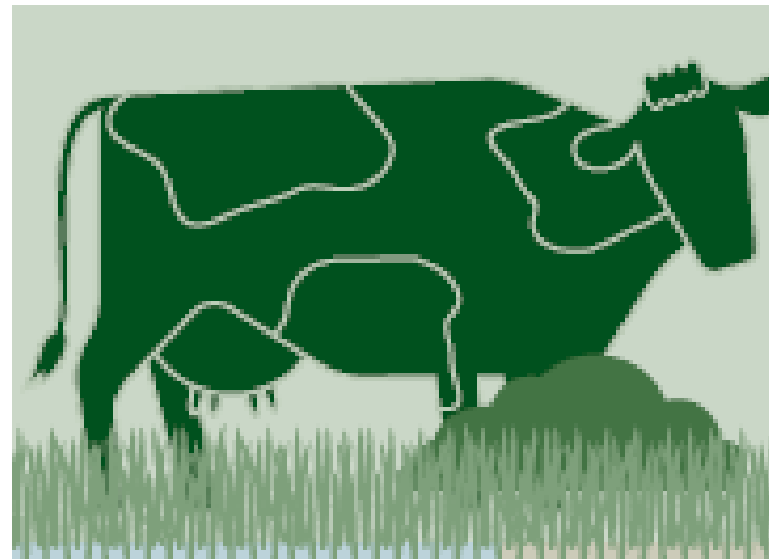
Action Plans

- Keep it simple
- Set up milestones and put Salmonella on the agenda
- Get cooperation from all stakeholders in development of a realistic action plan – in which areas will the herdowner make an effort?
- The herdowner must own the action plan
- Follow up, follow up, follow up – and plan this from the start
- Ensure that ALL employees are involved



Challenges

- Multiple infection stages – subclinical, acute, chronic
- Lack of understanding about the pathogenesis
- Lack of sensitive diagnostic test to detect infectious cattle
- Long survival in the environment
- Increasing herd size
- What about the healthy infectious carriers?
- What about the birds and all the other causes...?



Challenges

- Farmers lack of motivation
 - Lack of willingness to cooperate
 - Lack of support in some areas of the country
 - Lack of knowledge?
 - Lack of systematics



Future plans

- National restrictions
- Project 2020-2022
 - visits, coaching, follow up
 - Films and education
 - biosecurity, manure and biogas
 - new PCR testing on cow level
 - tool for buying in animal



Future plans?

- Focus on avoiding infecting other herds and reintroduction
 - All Level 2 herds are placed under official supervision by the Danish Government
 - Routine visit Order: Visit Level 1 first in the day.
 - Better visitor hygiene.
 - Delivery facilities.
 - Double fence around animals on grass.
 - Increased manure handling
 - Signage



Danish Cattle Farms Free from Salmonella Dublin!

