

A scanning electron micrograph (SEM) showing several Campylobacter bacteria. The bacteria are elongated, curved, and have a textured, almost wrinkled surface. They are connected by thin, brownish, thread-like structures, possibly flagella or pili. The background is dark, making the light-colored bacteria stand out.

## Jeremy Hall

Bernard Matthews Ltd

**Tackling public enemy number  
one – Campylobacter**

**Bernard**   
**Matthews**

- Industry aware of a rise in campylobacter's in consumers
- Incidence grew until it is now ten times the level of salmonella's.
- Early FSA seminars outlined the tragic impacts to humans.
- 2015 540K human cases. ( many think this is hugely under-estimated)
- Total UK 79,000 hospital confirmed cases, cost and impacts.
- 35,000 acquire Irritable bowel syn, 45,000 Rheumatoid fever.
- One person in seven develops life changing complications.
- Ten die every month, 120 per year.

# Testing options 2007- 09

- We originally tested Lactic acid as a decontaminant against a broad list of pathogens
- Then Lactic Acid use was later declared banned, so looked at other options for Campylobacter.
- We needed to find a new technology
- As Campylobacter was killed post freezing/defrost, as stated in EFSA reports. -
- Could we emulate via cryogenic gases?
- Trials started October 2010
- In-plant trials started June 2012 in Holton, then Brackley August 2013.

- Trials using organic acids progressed again in case it was an option.:
  - Results were inconclusive . Discolouration of skin
  - Campylobacter recovery and re-growth seen seven days later.
  - Consumers likely to react badly to chemical washes and dips.
- A new process must destroy Campylobacter with no re-growth
  - All tests on “Rapid Surface Chilling” killed bacteria with no recovery
  - Many trials completed on birds in a BOC cabinet research unit.
  - Six months of such trials before discussions with the FSA.
  - Direct contact with Nitrogen vapour essential to be effective.

- Excess chilling froze the carcass, but was effective
- Well over 95% of Campylobacter removed but not marketing compliant.
  - Process timing needed to be shortened, no muscle can freeze.
- **No part of the flesh can freeze to below -2°C. Re stated by DEFRA and EU Poultry meat marketing Regulations.**
- Standard blast freezing fails this test, as some parts freeze before others
  - wings and parts of drumsticks. Process ineffective against campylobacter's from air blast freezing.
- A wider temp range was requested by retailers and rejected by Brussels and DEFRA, they wanted tolerance to -5C but to call it fresh.!

# Full scale trials were needed

- To take the trials to industrial scale
  - A moving line unit was created by BOC gases and Pennine Engineering.
- Up to 6,000 birds per hour could be processed
  - After proving trials, 20 test runs completed with full microbiology
- FSA Vets and Campden staff supervised independent trial runs
  - Independent testing verified that all meat temperatures were compliant, EU Commission shown results and accept as meeting legislation, UK approved to adopt.
  - Product treated and placed on sale, and no adverse comments, as no visual difference, no organoleptic changes.



# The prototype unit 6000 birds per hour

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# Full detailed analysis completed



- Full line trials show delivery of the FSA/ BPC BRC target for 2015.
  - 90%+ of all carcasses carrying below 1000/g Campylobacter counts
  - The FSA target needs at least a one log reduction. - more ideally.
  - Rapid Surface chilling exceeds this figure
  - Several trials delivered 1.55 to 2.1 logs – delivered in 20 seconds.  
All microbiology results in Campden accredited labs.
  - 95% to 99%+ reductions delivered in such trials.
- Full scale in line trials could exceed this once in full time regular use.
- Tuning the process from day to day to maximum effect will follow when full unit installed.



## Birds exiting the unit.

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# Rapid Surface Chilling – 90% Reduction in Campylobacter; Compliant with EU Fresh Poultry Meat Regns.

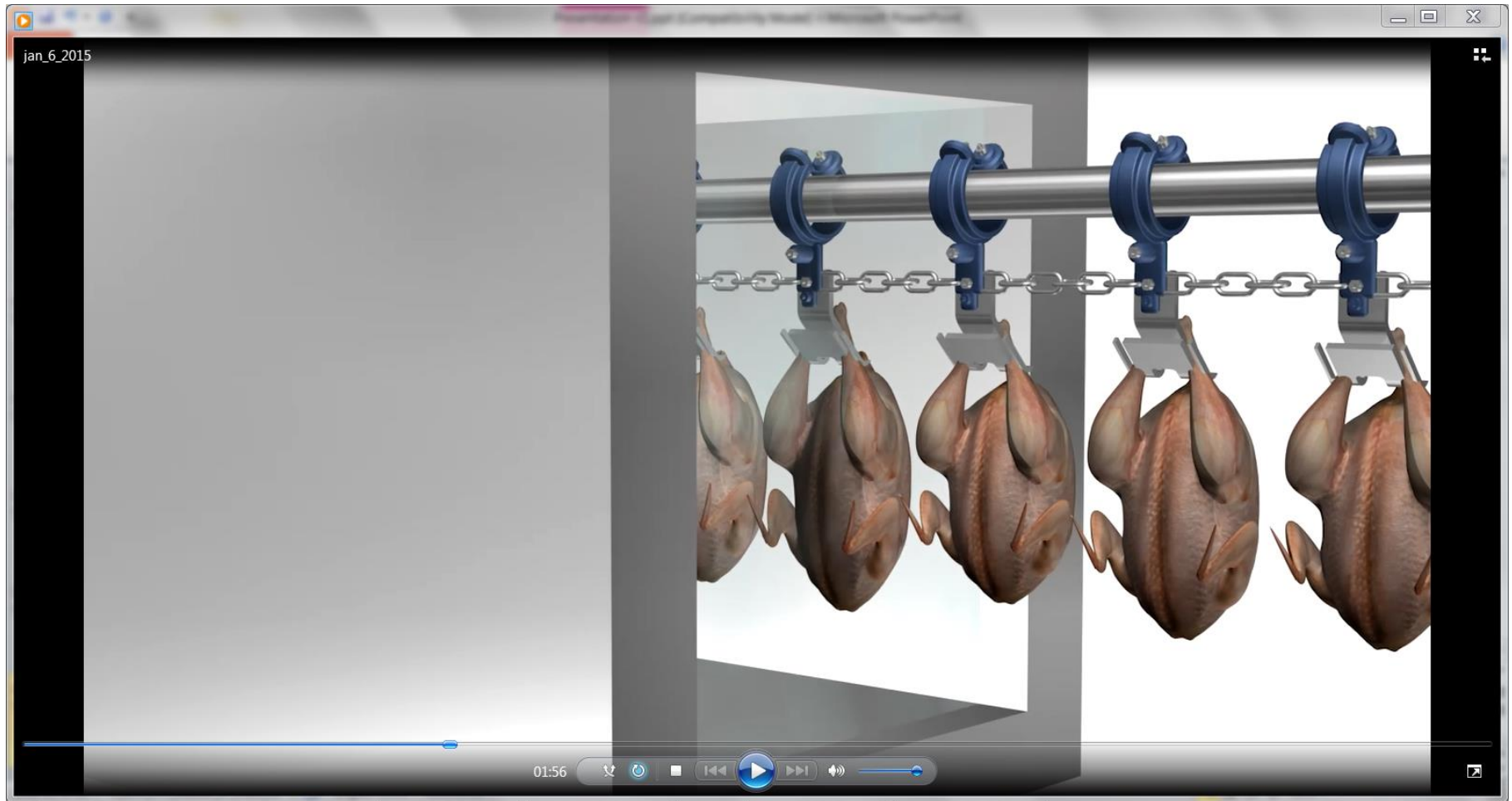
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The chicken skin is deep chilled, not the meat

# Chickens Enter RSC Tunnel

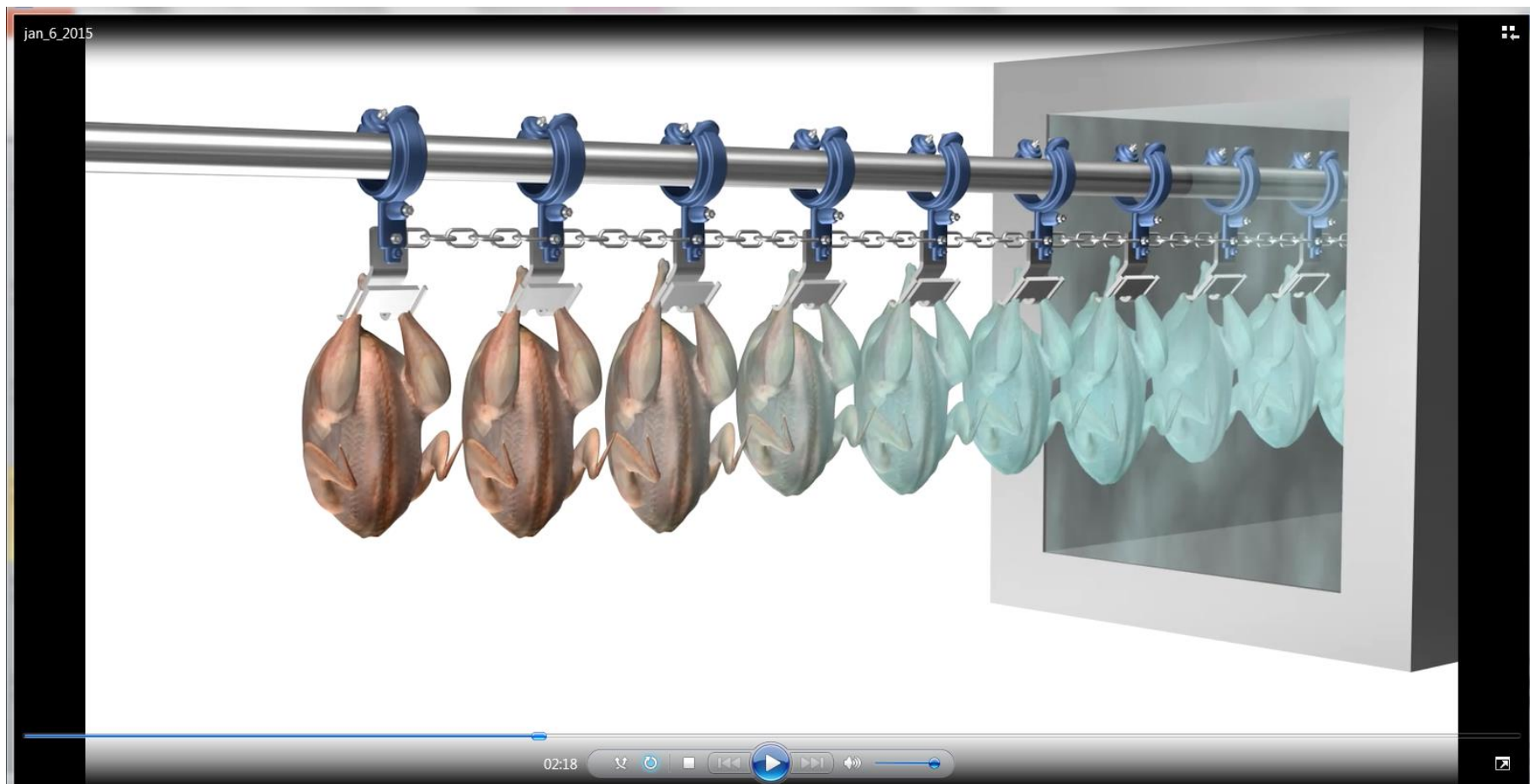


# Chickens inside RSC tunnel





# Chickens Exiting RSC Tunnel





# Processing issues – Evisceration

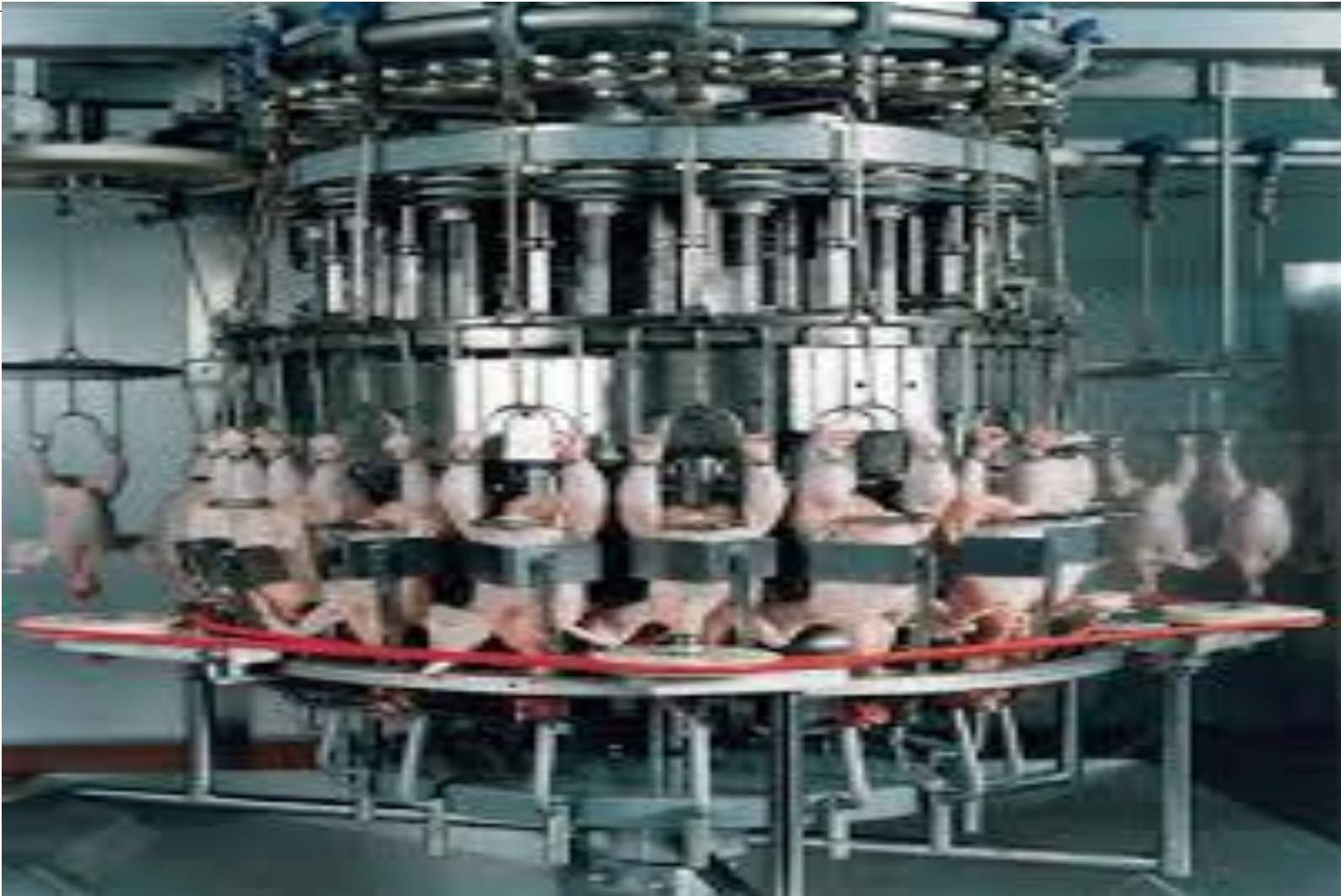


- Machines are in fenced off areas. Health + Safety !!
- Limited ability to set machines to minimum contamination
- Often covered in intestines and deposits of faeces.
- Vent drills cut the bird open , but spread campylobacter's from wash out function.
- Ceaca and vent contains 10/9 and 10/10 campylobacter's.
- 220 per minute, nearly four birds per second,

**The process takes place at  
220 birds per minute**

**Bernard  
Matthews**

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# The high speed rotary drill

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# Actions by retailers to date

- Whole birds an issue – use roaster bags
  - Some adopted a double bag system
  - Many consumers still open such bags and remove bird pre cooking.
  - They dislike the texture of bagged item when cooked, meat stated as too wet.
  - **No action so far by retailers to reduce high risk from skin on portions**
  - Thighs and drumsticks carry same loadings or higher than neck flaps.



Most chicken sold in portioned format ( approx 70% )



- Loadings on thighs and drumsticks high
- Vent drill cross contamination – faecal matter sprays across the back.
- Deep feather follicles on wings
- Roaster bags are not an answer for portions, as consumer handling creates increased risks and cross contamination.
- In line whole carcass treatments are needed for all infected flocks.
- **Delivery of safe poultry is available at low cost.**
- **Retailers need to adopt any technology that improves food safety.**
- **Better still adopt several systems – multiple barriers.**



# An update on machinery developments



- Much work has been completed on reduced treatment times
- Targeting reduced gas usage also. To reduce cost impacts.
- Trying to get data on per bird costs ( 4 to 6p/ bird) likely to be lower.
- Overall costs far lower than a roaster bag, and far safer.
- Delivers the only FSA approved tested system for delivering the ACT agreed targets by November 2015 latest. Results verified by Campden.
- We need to treat ALL infected birds when tested upon arrival in the plant (via rapid test systems) that deliver a good result in around 40 minutes.

# INTERVENTION OPTIONS

- Sonosteam – A Danish development sprays superheated steam over the skin, however it cooks skin at the same time.
- Trials so far show no effect, unless skin denatured /cooked.
- RSC has no negative effects, and delivers food safety.
- Lactic acid discolours the skin, it goes yellow and grey.
- Do we want to eat poultry meat covered in disinfectants.
- We just want far safer poultry for our families.

## Now the statistics human hospitalisations



- In 2013 England and Wales 57850 confirmed cases.
- In 2014 England and Wales 57830 confirmed cases
- Jan 2015 to April 2015 has again shown a 2% increase
- All the farm bio-security changes now implemented by the industry under Red Tractor audit **has delivered no change.**
- Introduction of new packaging technologies in the form of roast in the bag formats– **has delivered no change**

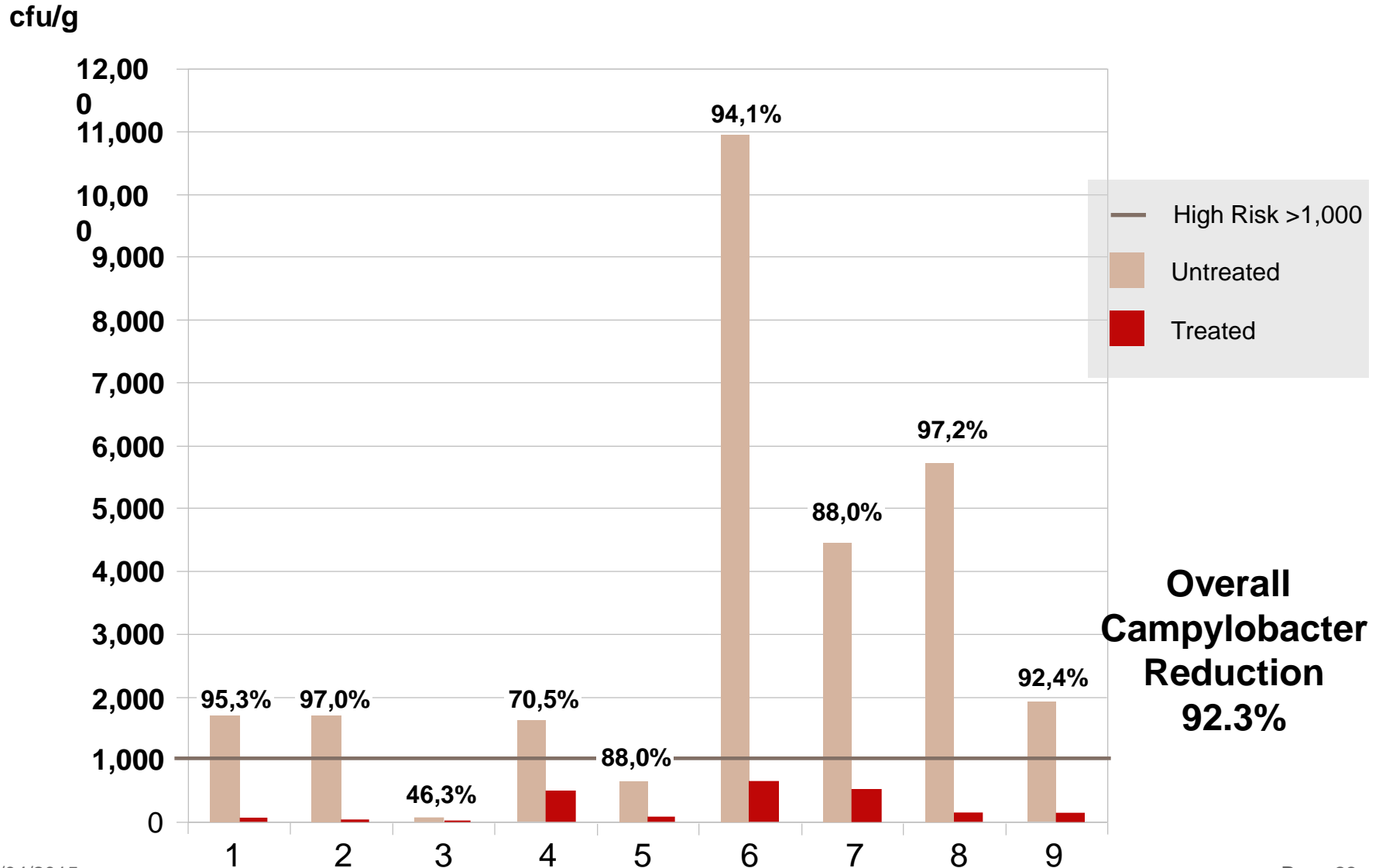
# Conclusions

- Its now almost certain the industry and retailers will miss the December 2015 target for full delivery.
- Not enough time left to deliver the interventions into slaughter plants.
- We need to remove campylobacter as a consumer threat.
- **To our consumers it is a “ No brainer” just do it.**
- For a cost of 6p/bird on cost it can be removed as an issue.
- So including retailer margin that's 10p per bird
- These can be used until a cheaper effective intervention is developed, vaccines are not an option.
- **What price a human life?**

# RSC Industrial Trial Results:

## Campylobacter Summary (cfu/g)

9 trials

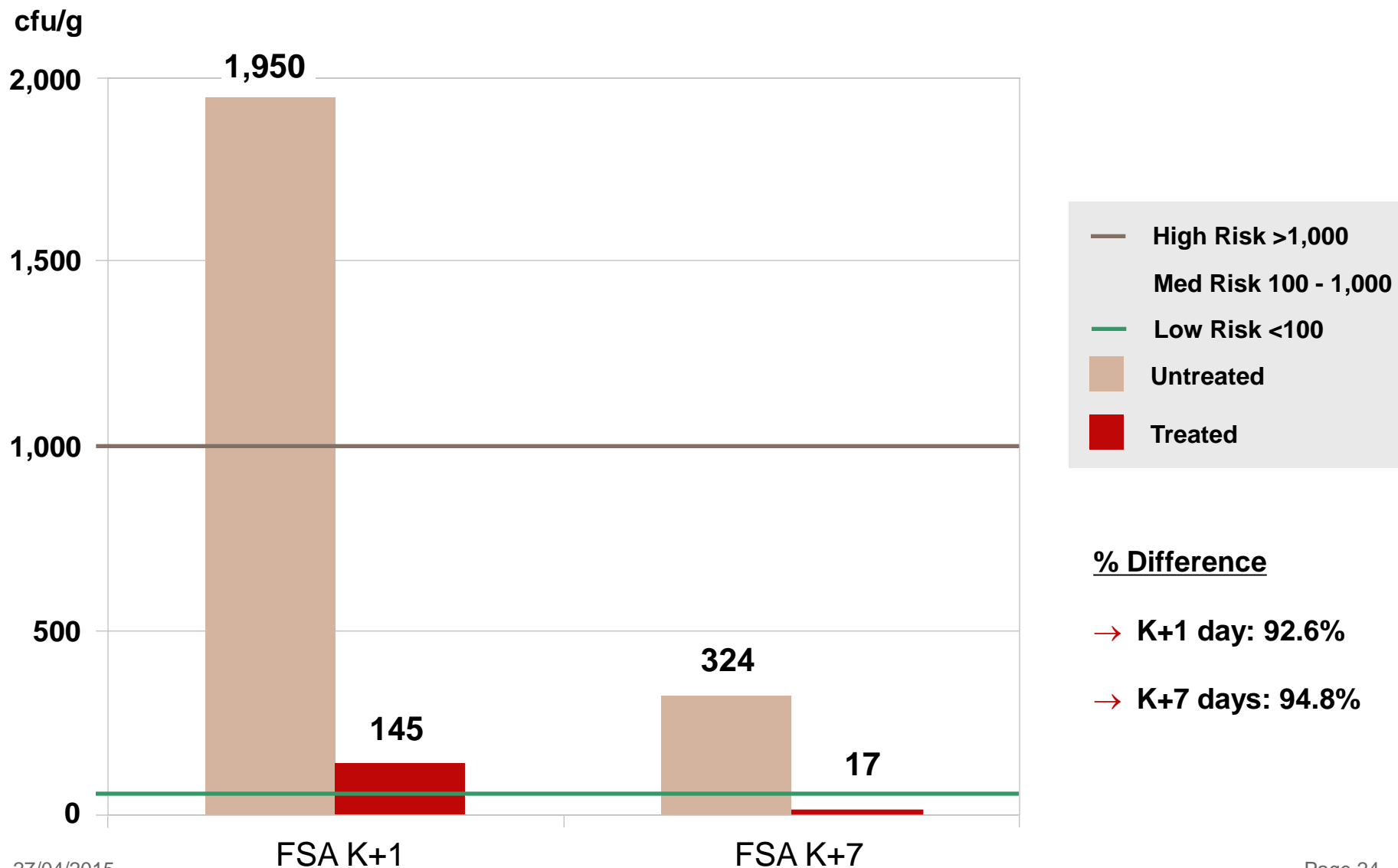




# RSC Industrial Trial Results:

## Campylobacter Summary (cfu/g)

### FSA Independent Trial



- Rapid Surface Chilling has been tested at an industrial scale.
- Technology has achieved 90%+ reduction in campylobacter and compliance with EU regulations for fresh poultry meat.
- BOC-Linde has now designed a full scale RSC machine capable of continuous operation.
- However no plant has so far ordered this machinery.
- No retailers demand supply of chicken that is treated to meet the EFSA and FSA food safety targets.
- Thinning of flocks is helpful but very limited in warm weather.
- Currently only one intervention delivers the poultry safety we need and should be offered.

# CONCLUSIONS

- Retailers need to stop talking and deliver action.
- Introduce any interventions that enhance food safety.
- Since the 05/2014 FSA Seminar and agreements – no change
- We must adopt and use multiple hurdles to cut disease.
- Worrying about Aldi and Lidl is a very high retailer priority
- **Offering all consumers safe food free from a very nasty pathogen should be a much greater priority.**