A Campylobacter szint telepen kívüli csökkentésének lehetőségei

Dr. Pedro Medel

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CAMPY BRO

INDEX

Slaughterhouse comparison

Campylobacter contamination in broiler carcasses and correlation with slaughterhouses operational hygiene inspection

Ihab Habib[a,h,*], Dirk Berkvens[b], Lieven De Zutter[c], Katelijne Dierick[d], Xavier Van Huffel[e], Niko Speybroeck[f], Annemie H. Geeraerd[g], Mieke Uyttendaele[a]

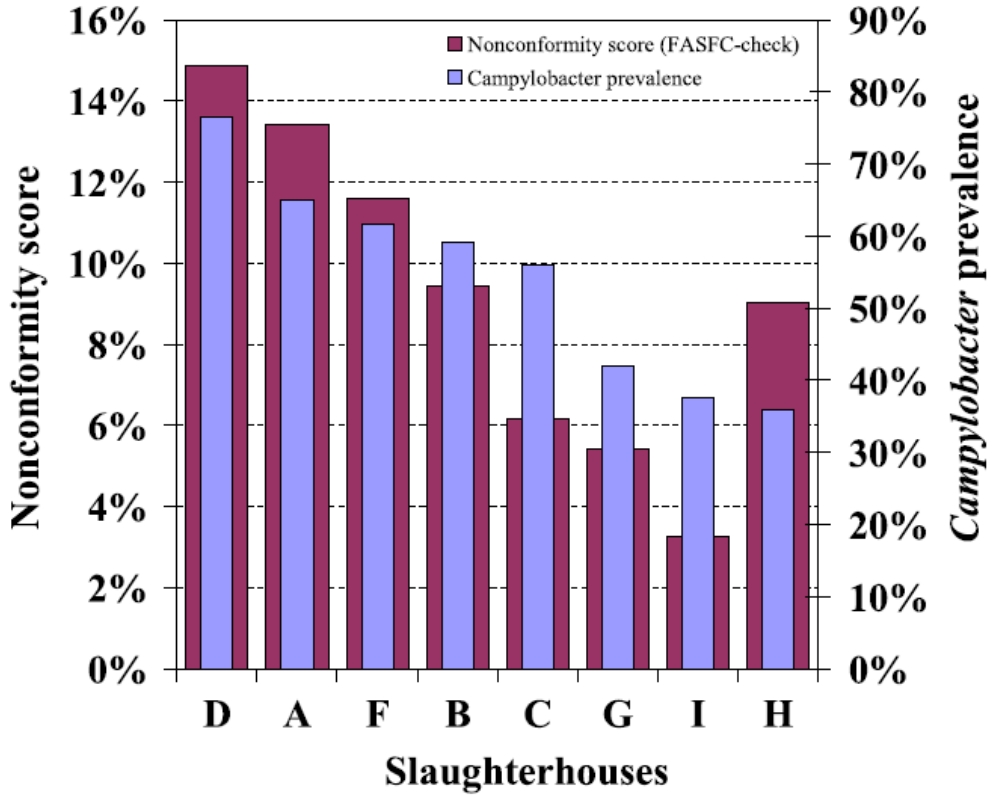


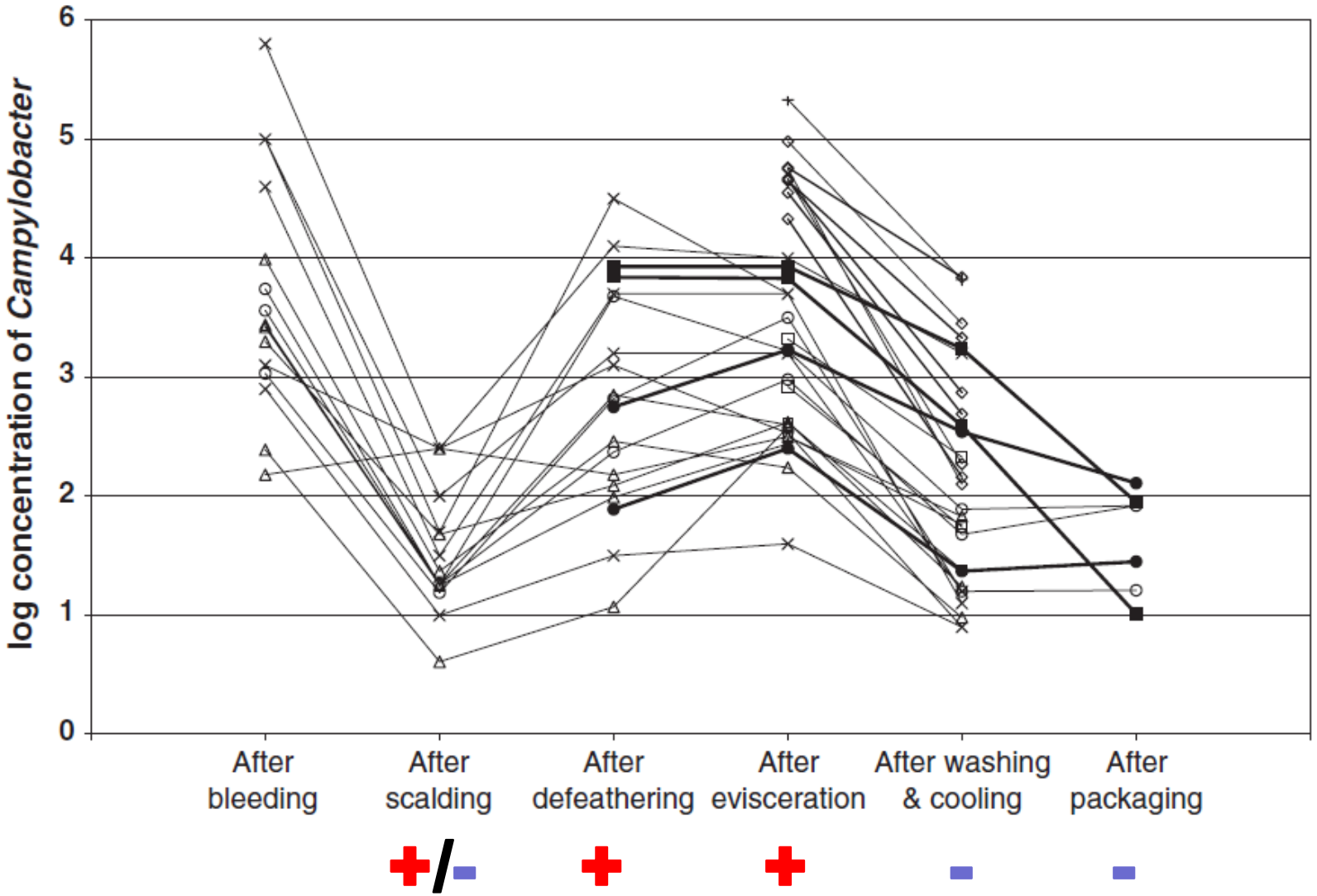
Fig. 4. Slaughterhouses hygiene inspection rank (based on FASFC-check non-conformity scores in 2008) and rank based on *Campylobacter* prevalence in carcasses (based on EU baseline data in 2008). Ranking starts from 1 (lowest; in hygiene non-conformity score/*Campylobacter* prevalence) to 8 (highest).

Variable	Detection data
	logistic regression model
	Odd ratio (95% CI)
Sampling month	
January[a]	1.00
February	0.81 (0.31–2.10)
March	0.73 (0.27–1.99)
April	0.50 (0.18–1.40)
May	1.04 (0.38–2.83)
June	4.46 (1.50–13.25)
July	1.04 (0.38–2.87)
August	1.09 (0.39–2.97)
September	3.70 (1.28–10.73)
October	1.17 (0.41–3.35)
November	1.40 (0.50–3.90)
December	0.98 (0.36–2.70)
Broilers age	1.04 (1.00–1.09)

Food Microbiology 29 (2012) 105–112

Slaughterhouse evolution of infection

H. Rosenquist et al. / International Journal of Food Microbiology 108 (2006) 226–232



Slaughterhouse evolution of infection

A comparison of fluctuations of *Campylobacter* and *Escherichia coli* concentrations on broiler chicken carcasses during processing in two slaughterhouses

Ewa Pacholewicz [a,b,*], Arno Swart [c], Maarten Schipper [c], Betty G.M. Gortemaker [a], Jaap A. Wagenaar [d,e,f], Arie H. Havelaar [g,a,c,h], Len J.A. Lipman [a]

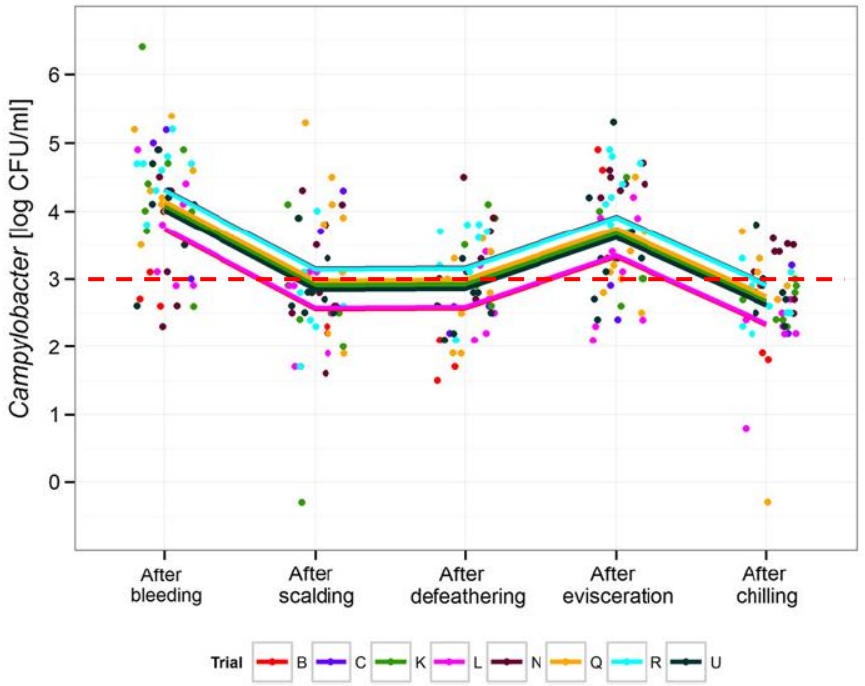


Fig. 3. *Campylobacter* concentrations in whole broiler carcass rinse samples (log CFU/ml) after selected processing steps in Slaughterhouse 1. The lines indicate the concentrations per sampled batch (trial), based on the selected model (Table 2); the points indicate the concentrations in the individual samples.

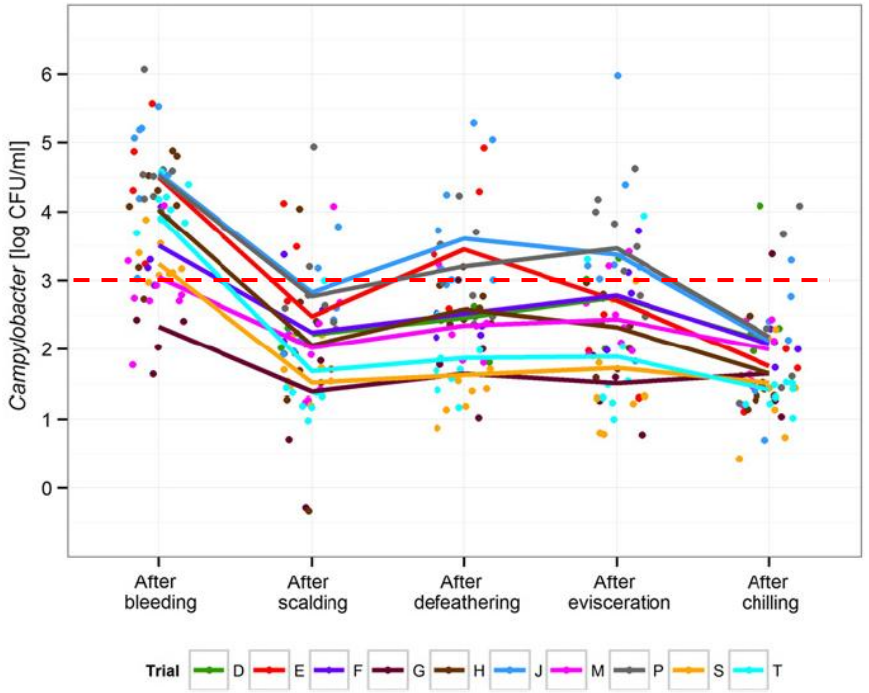


Fig. 5. *Campylobacter* concentrations in whole broiler carcass rinse samples (log CFU/ml) after selected processing steps in Slaughterhouse 2. The lines indicate the concentrations per sampled batch (trial), based on the selected model (Table 2); the points indicate the concentrations in the individual samples.

International Journal of Food Microbiology 205 (2015) 119–127

Slaughterhouse evolution of infection

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Slaughterhouse	Processing step	*Campylobacter* log10	*Campylobacter* p value
Slaughterhouse 1	Scalding–bleeding	−1.17	<0.01*
	Defeathering–scalding	0.01	0.92
	Evisceration–defeathering	0.75	<0.01*
	Chilling–evisceration	−1.00	<0.01*
	Total decrease: chilling–bleeding	−1.40	<0.01*
Slaughterhouse 2	Scalding–bleeding	−1.58	<0.01*
	Defeathering–scalding	0.41	0.01*
	Evisceration–defeathering	−0.03	0.86
	Chilling–evisceration	−0.65	<0.01*
	Total decrease: chilling–bleeding	−1.86	<0.01*

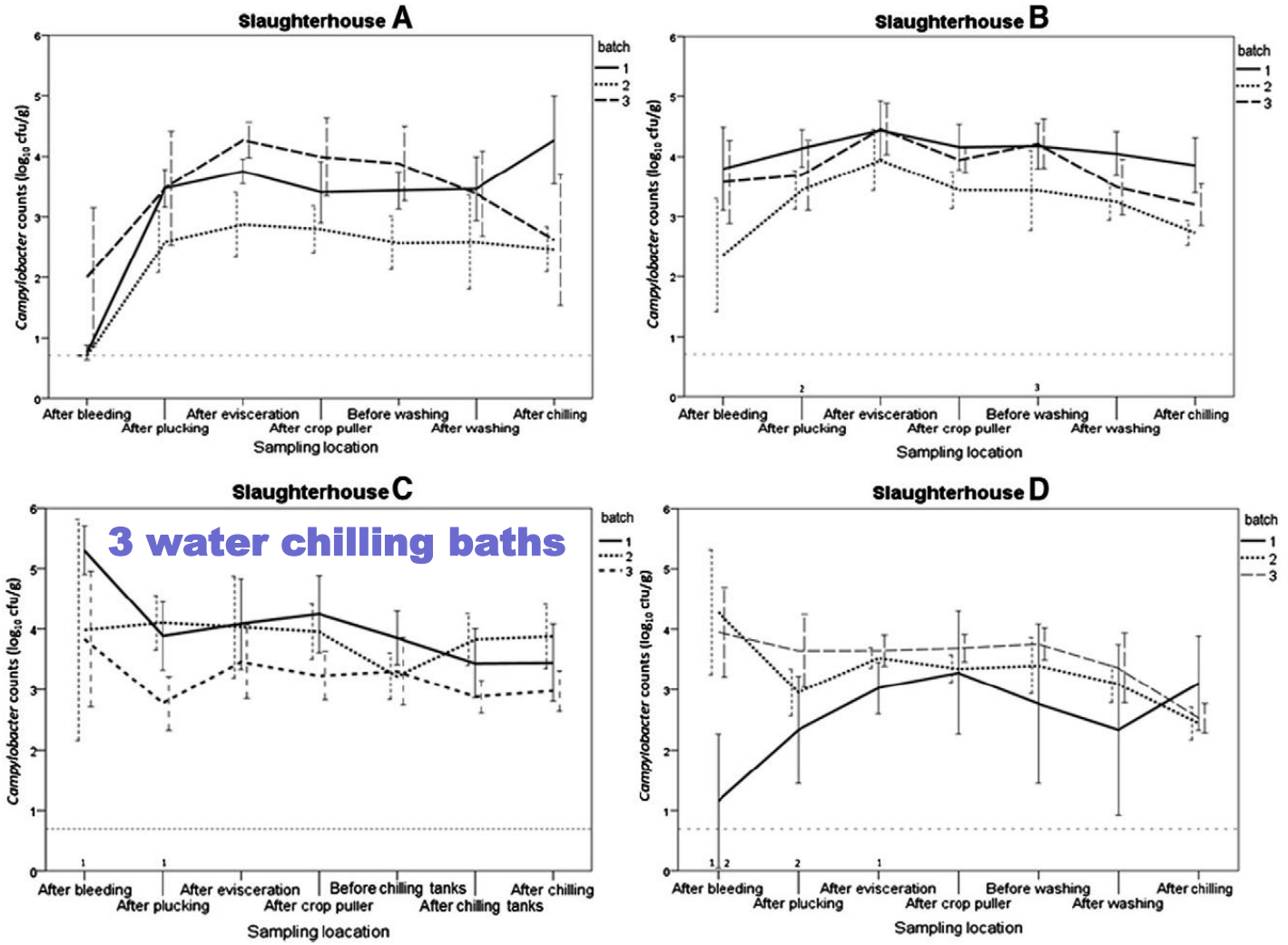
International Journal of Food Microbiology 205 (2015) 119–127

Slaughterhouse evolution of infection

Campylobacter carcass contamination throughout the slaughter process of *Campylobacter*-positive broiler batches

International Journal of Food Microbiology 194 (2015) 25–31

Tomasz Seliwiorstow [a,*], Julie Baré [a], Inge Van Damme [a], Mieke Uyttendaele [b], Lieven De Zutter [a]



Slaughterhouse evolution of infection

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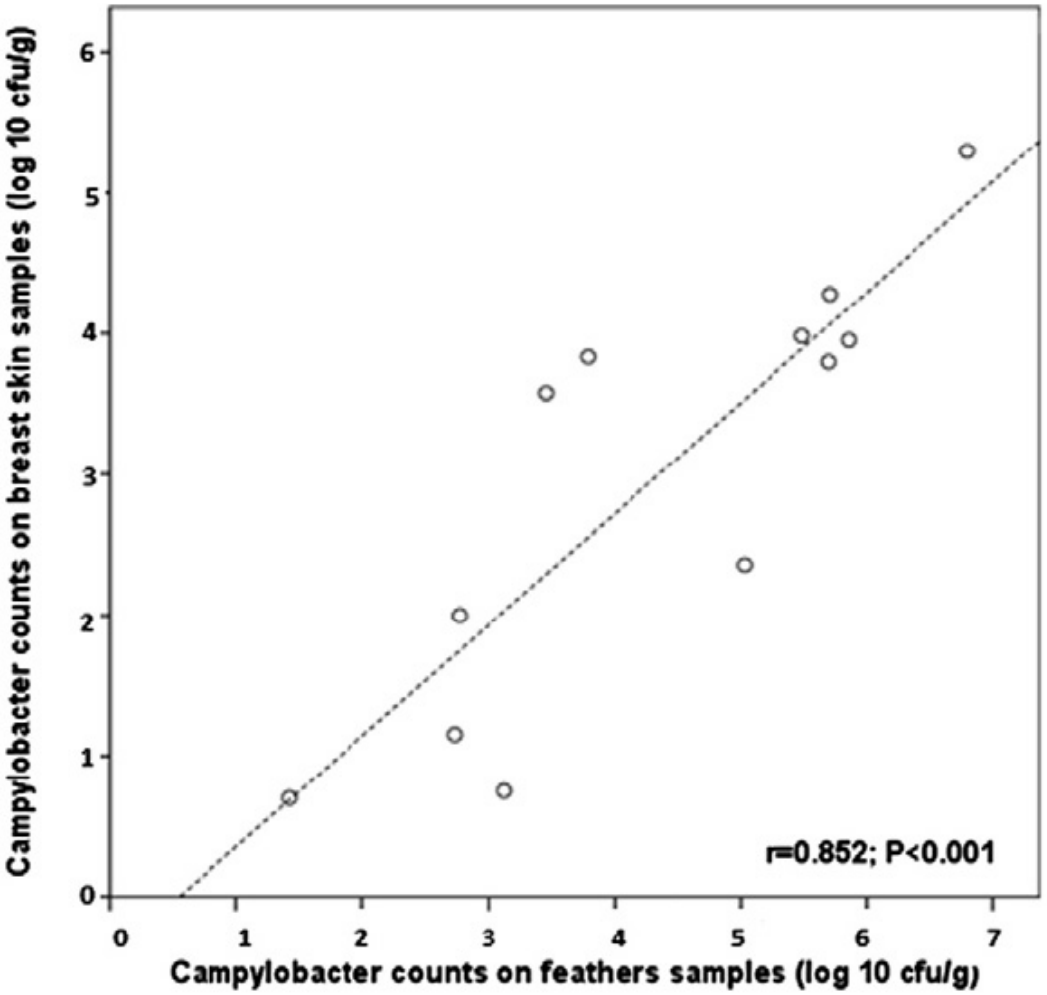

r slaughterhouses.

um		Feathers	
	b[2]	a[1]	b[2]
1.32	4/6	3.13 ± 1.26	5/6
	0/6	1.42 ± 1.78	1/6
0.37	1/6	2.77 ± 1.87	5/6
0.93	6/6	5.70 ± 0.25	6/6
0.93	6/6	5.03 ± 0.52	6/6
1.05	6/6	3.46 ± 1.45	5/6
0.73	6/6	6.80 ± 0.36	6/6
0.69	6/6	5.49 ± 0.87	5/6
1.39	6/6	*3.79 ± 2.40	4/6
1.50	3/6	*2.73 ± 1.74	4/6
0.52	6/6	5.71 ± 0.62	6/6
0.84	6/6	5.86 ± 0.58	6/6

Slaughterhouse evolution of infection

Identification of risk factors for *Campylobacter* contamination levels on broiler carcasses during the slaughter process

International Journal of Food Microbiology 226 (2016) 26–32

Tomasz Seliwiorstow [a,c,*], Julie Baré [a,1], Dirk Berkvens [b], Inge Van Damme [a], Mieke Uyttendaele [c], Lieven De Zutter [a]

Sampling site	No[a]	Explanatory variable	Coef.[b]
After bleeding	4	Unloading system	
		— Draw$ers	–
		— Contain$er	1.82
	21	Transport and holding time	−0.35
	33	Mean *Campylobacter* counts on feather samples	1.15
After plucking	3	Stunning	
		— Gas	–
		— Electrical	2.08
	21	Transport and holding time	−0.31
	31	Mean *Campylobacter* counts in caecal content	0.85
After evisceration	21	Transport and holding time	−0.22
	22	Temperature of scalding water[d]	−0.52
	25	Percentage of carcasses with feathers on breast after plucking	−0.12
	31	Mean *Campylobacter* counts in caecal content	0.95
After Washing[e]	3	Stunning	
		— Gas	–
		— Electrical	1.12
	21	Transport and holding time	− 0.21
	26	Percentage of carcasses with damaged cloaca	0.17
	31	Mean *Campylobacter* counts in caecal content	0.79
After chilling	21	Transport and holding time	− 0.29
	28	Percentage of ruptured gastrointestinal packages	0.06
	31	Mean *Campylobacter* counts in caecal content	1.83

Slaughterhouse evolution of infection

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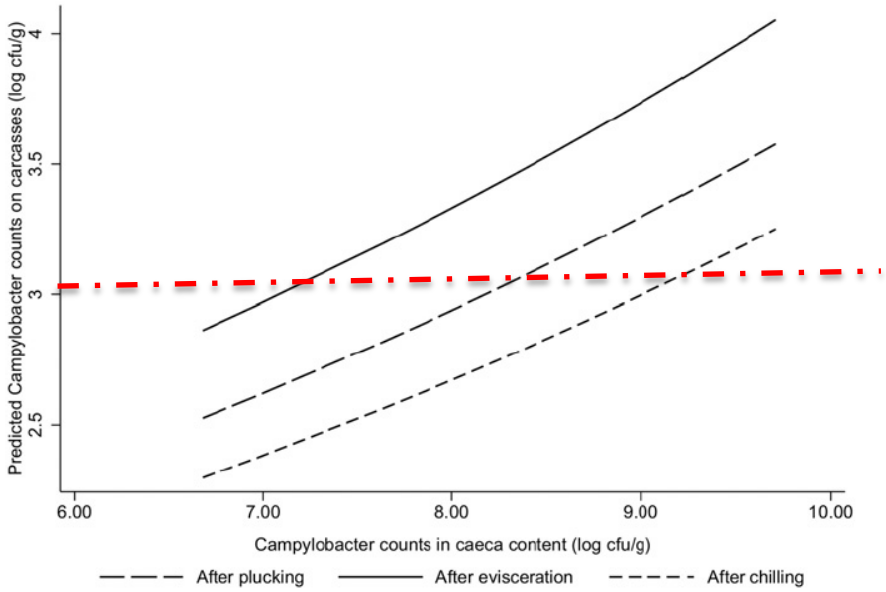


Fig. 1. Expected *Campylobacter* counts across caecal colonization levels, given for selected sampling sites: after plucking, after evisceration and after chilling.

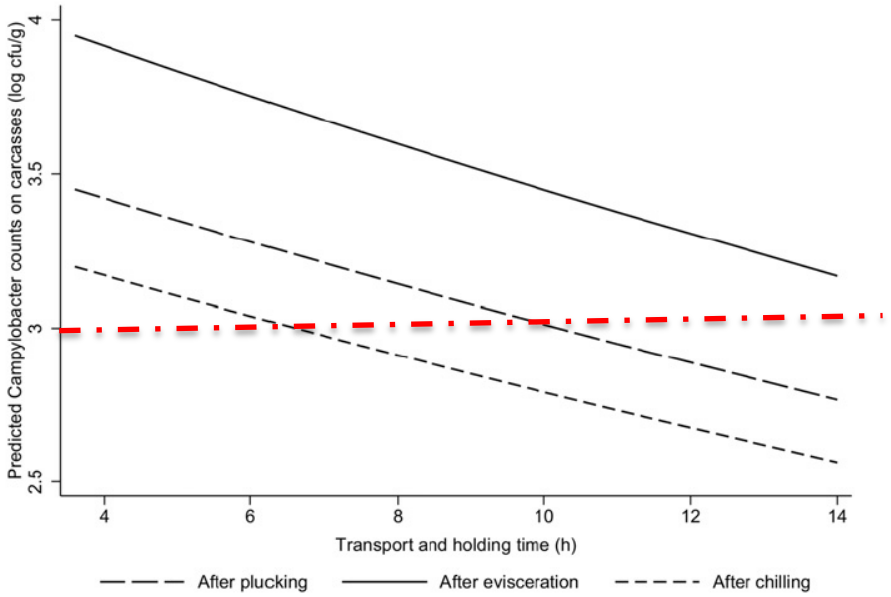


Fig. 2. Expected *Campylobacter* counts across transport and holding time, given for selected sampling sites: after plucking, after evisceration and after chilling.

Slaughterhouse evolution of infection

Effects of slaughter operations on the microbiological contamination of broiler carcasses in three abattoirs

Claudio Zweifel*, Denise Althaus, Roger Stephan

Food Control 51 (2015) 37–42

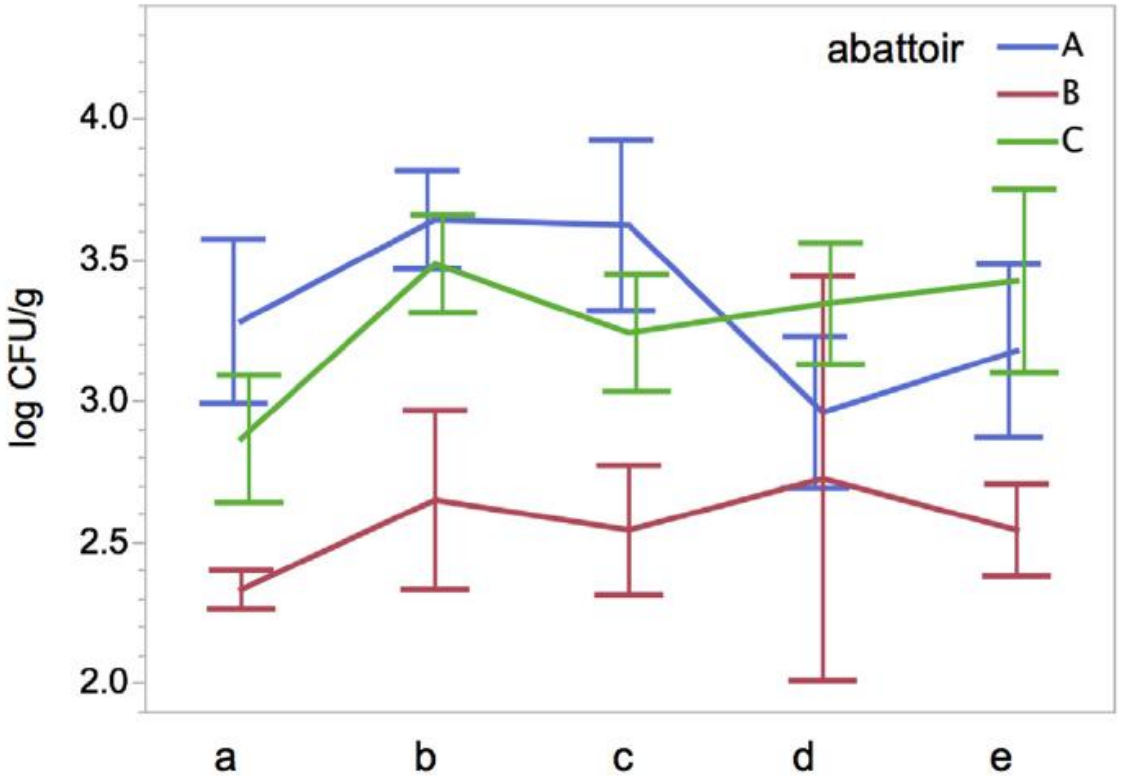


Fig. 1. Mean *Campylobacter* counts from broiler carcasses with results ≥2.3 log CFU/g: (a) after scalding, (b) after plucking, (c) after evisceration, (d) after washing and (e) in the chiller (n = 450 at each abattoir, error bars represent 95% confidence intervals).

Slaughterhouse recommendations

- Pre harvest measures to decrease the Cecal counts
- Cleanliness of the birds
  - Litter management
- Fasting time + transport and holding time: 12h
- Stunning
  - Gas
- Homogeneity (fattening by sex?)
- Scalding water temperature
  - Multiple tank if possible
  - Highest without skin problems
  - Renovation or pasteurization between batches/work shift if possible

Slaughterhouse recommendations

- Unplucking process
  - Adjustment of machine
  - Avoid press the carcasses (fecal output)
- Evisceration
  - Adjustment of machine
  - Special care with carcasses with visible contamination

Food Control 68 (2016) 367–378

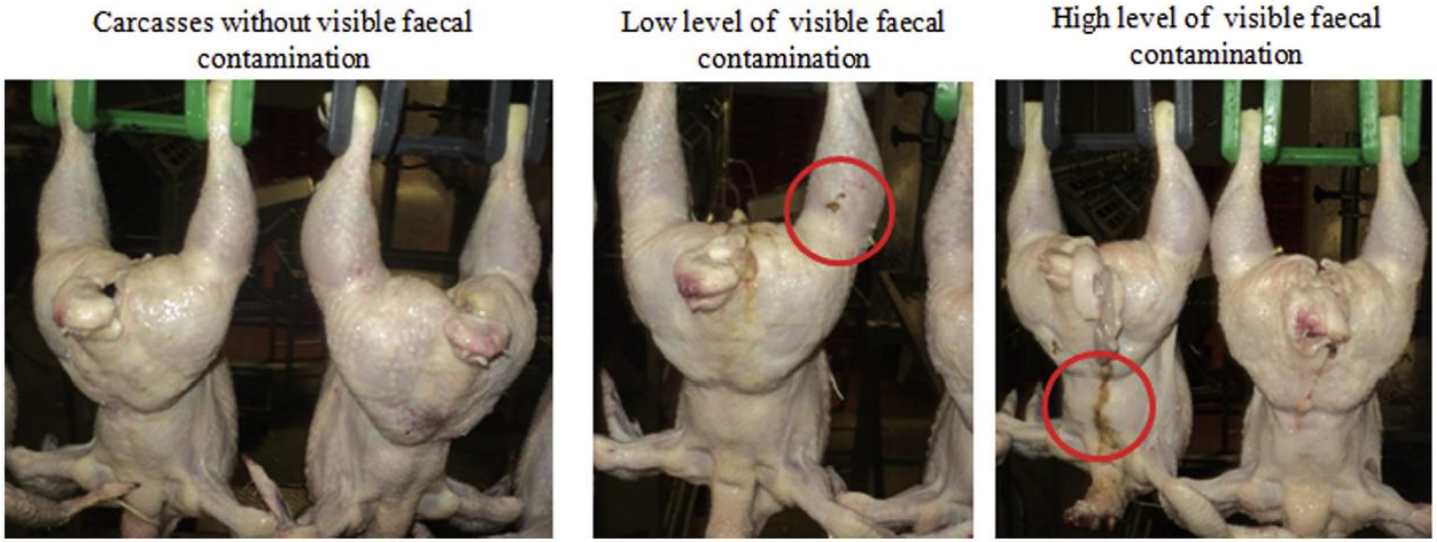


Fig. 1. Visual aids to judging the level of visible faecal contamination on carcasses.

Slaughterhouse recommendations

- **Chilling process**
  - **Key point to decrease the contamination**
    - **0,5-1 log_{10}CFU/g**
  - **Air chilling better than water chilling (desiccation) [without disinfectants]**

Peroxyacetic acid

SCIENTIFIC OPINION

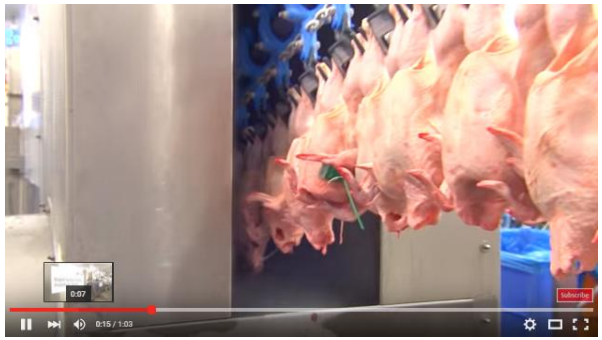
Scientific Opinion on the evaluation of the safety and efficacy of peroxyacetic acid solutions for reduction of pathogens on poultry carcasses and meat[1]

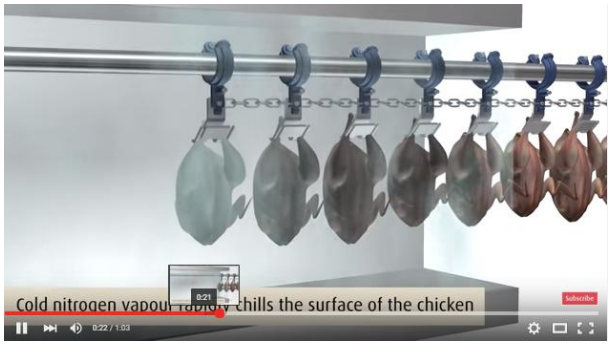
EFSA Panel on Biological Hazards[2, 3]

Studies evaluating the safety and efficacy of solutions, containing peroxyacetic acid (PAA) as the active ingredient, in mixtures with acetic acid, hydrogen peroxide, and 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) and possibly octanoic acid and peroxyoctanoic acid, for reduction of pathogens on poultry carcasses and meat were assessed. Treatments at ambient temperature consisted of dipping in short term baths, in chiller baths or spraying. On the basis of the previous EFSA exposure scenarios including short term baths that were not evaluated previously, no toxicity concerns were identified with regard to residues of peroxyacids, to HEDP and to possible reaction products of hydrogen peroxide and peroxyacids with lipids and proteins of the poultry carcasses. A relevant reduction of PAA treatment on *E. coli* and coliforms was demonstrated by dipping warm carcasses, but few data were available for pathogens (*Salmonella* and *Campylobacter*). Spraying appeared to be

Ad-hoc steps to reduce *Campylobacter*

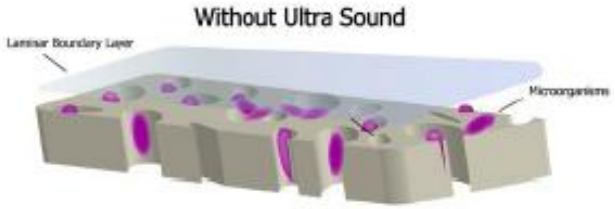
- **Rapid surface chilling: Crust freezing**
- **In continuous**
- **1mm**
- **Liquid nitrogen -196ºC**
  - -1 log

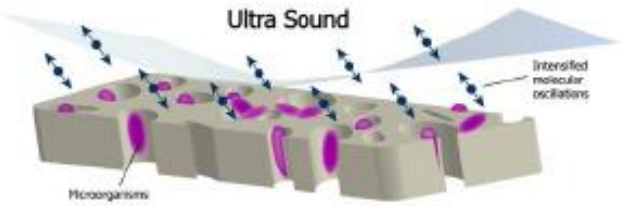


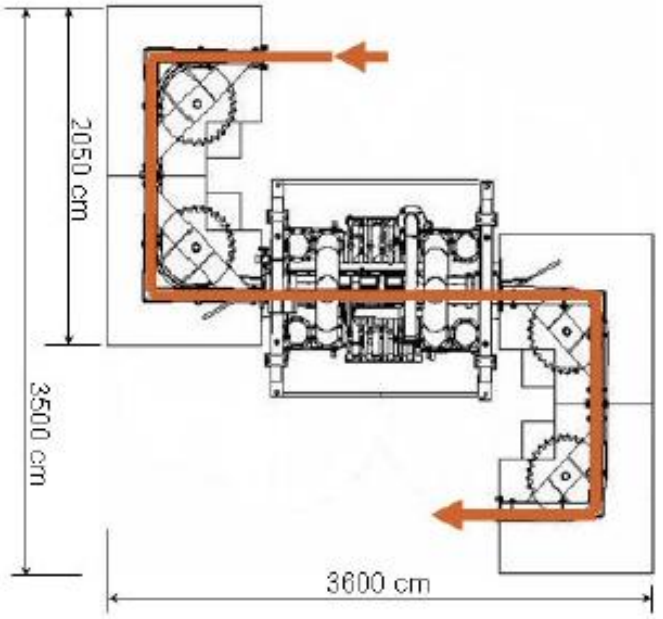


Ad-hoc steps to reduce *Campylobacter*

Steam and ultrasound







Domínguez, 2015

Other measures

- Freezing carcasses
- Roasted chicken
- Skin and neck withdrawal

POULTRY FOOD SAFETY CONTROL INTERVENTIONS IN THE DOMESTIC KITCHEN

D. BOLTON[1,3] H. MEREDITH[1,2], D. WALSH[1] and D. MCDOWELL[2]

Journal of Food Safety **34** (2014) 34–41

TABLE 3. THE REDUCTION IN *CAMPYLOBACTER* INOCULATED ONTO POULTRY FILLETS AND STORED AT –20C OVER A PERIOD OF 6 WEEKS

	Campylobacter CFU/g	
Storage (weeks)	After freezing	SE†
0	5.34[a]	0.11
1	3.61[b]	0.09
2	3.24[c]	0.15
3	3.03[c,d]	0.08
4	2.81[d]	0.11
5	2.35[e]	0.13
6	1.88[f]	0.17

Comparisons were made between storage week stage. The same letter indicates not statistically different at the 5% level ($P > 0.05$).
† SE, standard error.

Other measures

❑ Modified atmospheric packaging (MAP)

Effect of different modified atmospheric packaging (MAP) gaseous combinations on *Campylobacter* and the shelf-life of chilled poultry fillets

Food Microbiology 44 (2014) 196–203

H. Meredith [a, d], V. Valdramidis [b], B.T. Rotabakk [c], M. Sivertsvik [c], D. McDowell [d], D.J. Bolton [a, *]

Studies were undertaken to investigate the effect of different modified atmospheric packaging (MAP) gaseous combinations on *Campylobacter* and the natural microflora on poultry fillets. Skinless chicken fillets were stored in gaseous mixtures of 10%, 30%, 50%, 70% and 90% CO_2 balanced with N_2, 80:20% O_2:N_2 and 40:30:30% CO_2:O_2:N_2 and control conditions (air) at 2 °C. Samples were analysed periodically for (previously inoculated) *Campylobacter*, total viable counts (TVC) (mesophiles), TVC (psychrophiles), *Enterobacteriaceae*, *Pseudomonas* and lactic acid bacteria (LAB) over 17 days of storage. The carbon dioxide solubility was determined by monitoring the changes in the headspace volume over time using a buoyancy technique and performing calculations based on volumetric measurements and the Henry's constant. Henry's constant was also used to estimate the oxygen solubility in the chicken fillets. The presence of O_2 in the MAP gaseous mixtures increased the rate of *Campylobacter* decline on poultry fillets but in general the counts obtained in aerobic versus anaerobic packs were not significantly ($P > 0.05$) different. CO_2 inhibited the growth of TVC, TEC, LAB and *Pseudomonas* but only at MAP gaseous combinations containing 50–90% CO_2 where concentrations of up to 2000 ppm CO_2 were recorded in the fillets after 5 days. Under these conditions a shelf-life in excess of 17 days at 2 °C was obtained. Although, dissolved O_2, at levels of 33 ppm in 80:20% O_2:N_2 packs after 3 days, reduced *Campylobacter*, it also favoured the growth of the other microbes on the chicken. The optimum gaseous mixture for achieving the combined objectives of reducing *Campylobacter* and extending shelf was therefore 40:30:30 CO_2:O_2:N_2, which achieved a shelf-life in excess of 14 days.

Consumer (FSA)

Your quick guide to

campylobacter

Food Standards Agency
food.gov.uk

Campylobacter (pronounced *cam-pie-lo-bac-tor*) is a spiral-shaped bacterium that is the most common cause of food poisoning in the UK. You can't see it, smell it or even taste it on food, but if you get food poisoning from campylobacter, you won't forget it. The most common cause of campylobacter poisoning is chicken and other poultry that's not cooked or handled properly.

Campylobacter facts

More than

280,000

cases of **campylobacter poisoning** in the UK **every year.***

The amount of chicken sold in the UK that was **contaminated with campylobacter,** between May 2007 and Sept 2008.**

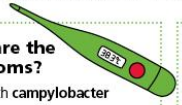
Up to **4** in **5** cases of **campylobacter poisoning** in the UK and other EU countries come from **contaminated poultry.*****

Campylobacter is estimated to cause **more than 100 deaths a year** and costs the UK economy **c.£900 million***

Don't wash raw chicken

How is campylobacter spread?

In the kitchen, two of the most common ways are through cross-contamination and undercooked chicken. Cross-contamination is when harmful bacteria spreads from one surface to another. Washing raw chicken can spread bacteria onto hands, work surfaces, clothing and kitchen equipment – so don't do it!



What are the symptoms?

People with **campylobacter poisoning** can get **severe diarrhoea, abdominal pain, fever** and sometimes **vomiting**. It can sometimes take up to 10 days to get better. It can also lead to irritable bowel syndrome, reactive arthritis and Guillain-Barré syndrome (this is a serious condition of the nervous system). At its worst, it can kill.

Who can get it?

Anyone who is exposed to the bacteria can get ill from it, but **young children, under the age of five** and those **over 60** are at a greater risk.

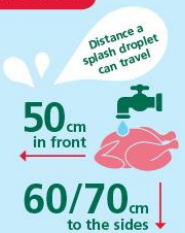
What treatment is there?

Most people **recover without treatment** within **two to five days**. A **re-hydration solution** to combat dehydration (losing water, sugars and minerals through diarrhoea or vomiting) can help. **Severe infections** are treated with **antibiotics**.

How can you avoid it?

Don't wash raw chicken

You don't need to wash raw chicken before cooking it. Washing chicken can **spread germs** around the kitchen **by splashing** them onto other surfaces and utensils.



Practise good kitchen hygiene

Thoroughly **wash and clean all utensils, chopping boards** and **surfaces** used to prepare raw chicken. Do remember to also **wash your hands** with soap and warm water after handling raw chicken to **prevent cross-contamination**.

Store raw chicken correctly

Cover raw chicken and store at the **bottom of the fridge** so juices cannot drip on to other foods and **contaminate** them.

Cook chicken thoroughly

Make sure you cook your chicken thoroughly to **kill any bacteria** present, including campylobacter. Chicken must be **steaming hot all the way through** before serving, with **no pink meat**. Juices must run clear.

For more information, visit: **food.gov.uk/chicken**
Let's keep connected at **food.gov.uk/facebook**
Join our conversation **@foodgov** using **#PlayingChicken**
Watch us on **food.gov.uk/youtube**

Sources:
* FSA estimates **FSA survey of chicken on sale in the UK (2007-2008)
*** European Food Safety Authority scientific opinion (adopted 2009) http://www.efsa.europa.eu/en/scdocs/scdoc/1437.htm

Roasted without manipulation

POULTRY FOOD SAFETY CONTROL INTERVENTIONS IN THE DOMESTIC KITCHEN

D. BOLTON[1,3] H. MEREDITH[1,2], D. WALSH[1] and D. MCDOWELL[2]

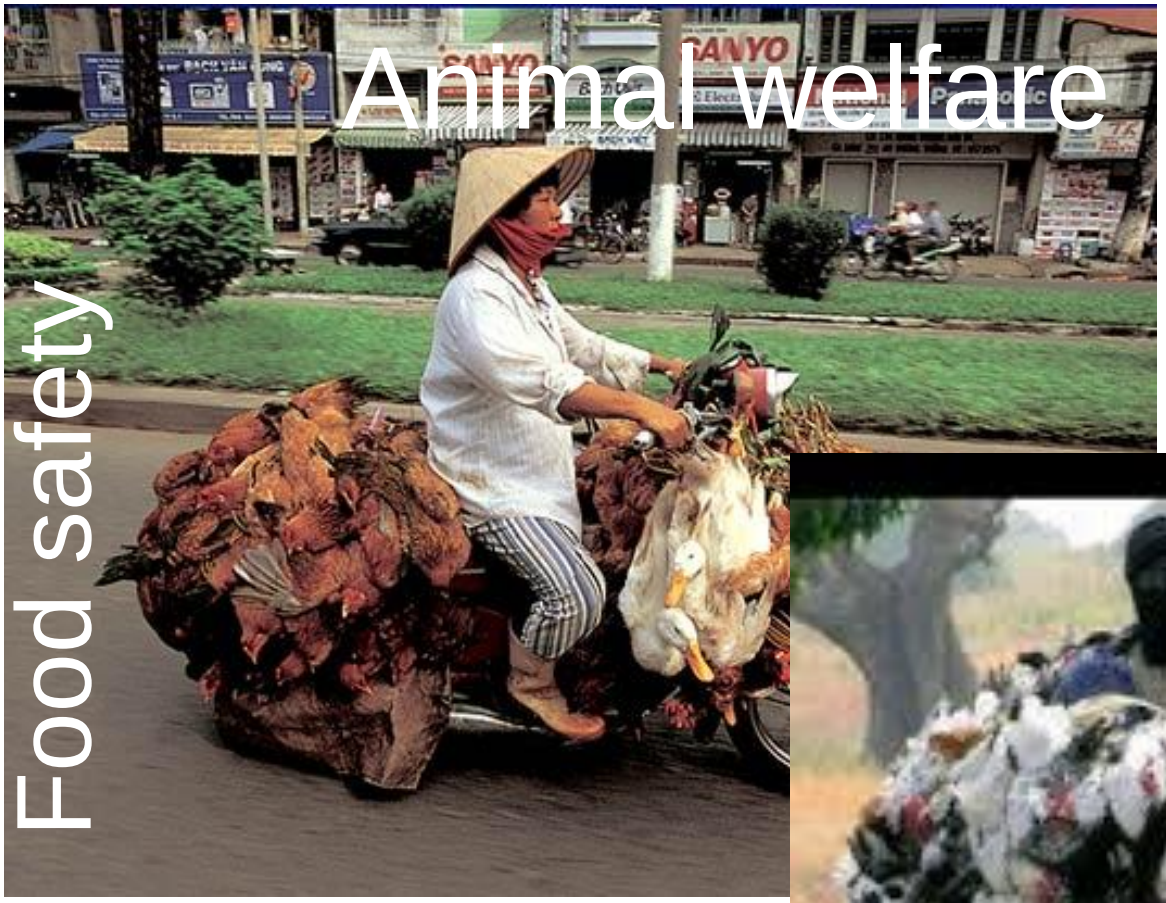
Journal of Food Safety **34** (2014) 34–41

TABLE 2. TRANSFER OF *P. FLUORESCENS* FROM THE RAW FILLET TO HANDS, EQUIPMENT AND THE KITCHEN ENVIRONMENT AND THE EFFECT OF CLEANING/WASHING WITH WARM WATER AND WASHING UP LIQUID

	Mean counts after conventional preparation (log_{10} CFU/cm^2)		Mean counts after cook-in-the-bag preparation (log_{10} CFU/cm^2)	
Sampling site	Before washing	After washing	Before washing	After washing
Hands	3.30	ND	ND	ND
Chopping board	5.24	2.78	NT	NT
Knife handle	2.81	0.52	NT	NT
Knife blade	2.76	ND	NT	NT
Dishcloth	1.5	0.67	NT	NT
Refrigerator handle	0.65	ND	ND	ND
Microwave handle	0.91	ND	ND	ND
Microwave buttons	1.54	ND	ND	ND
Press handle	0.57	ND	NT	NT
Oven handle	0.71	ND	ND	ND
Plate	4.45	ND	0.91	ND
Tinfoil	0.94	ND	NT	NT
Tap	ND	ND	ND	ND
Draining board	0.28	0.17	ND	ND

ND, not detected; NT, not tested because this equipment was not used with the cook-in-the-bag technology.

www.campybro.eu


Animal welfare
Food safety


Environment
Animal health