European Commission

Cost-benefit analyses of various control options

DG SANCO workshop on the control of Campylobacter in poultry

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Health and Consumers

Analysis of the costs and benefits of setting certain control measures for reduction of Campylobacter in broiler meat at different stages of the food chain

A report for DG SANCO of the European Commission
Carried out by ADAS UK Ltd.

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Project scope

The analysis was required to consider:

- cost of monitoring by food business operators;
- cost of monitoring by competent authorities to verify correct implementation by food business operators;
- cost of different control options and combinations of control options needed to obtain the objectives;
- cost of withdrawal or recall of products taking into account realistic scenarios;
- expected social impact;
- impact on imports of broiler meat;
- reduction of human health burdens.

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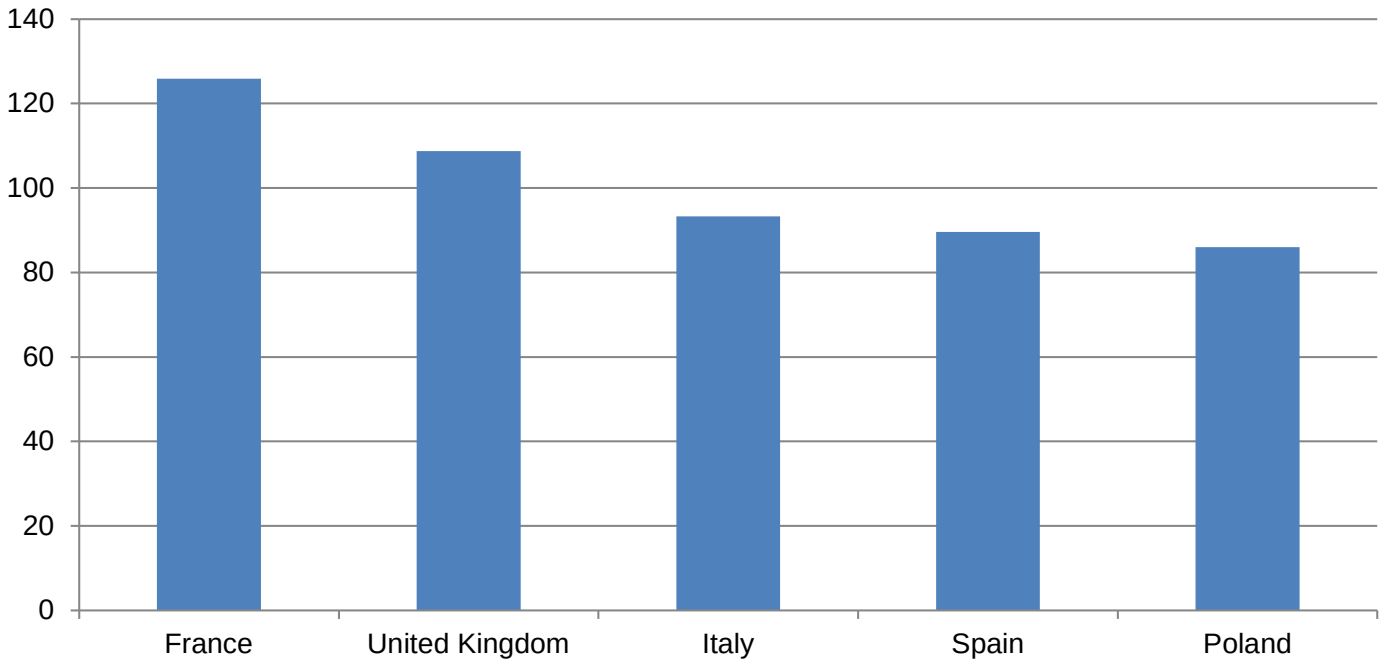
EU broiler sector

Figure 1.1 Number of broilers in agricultural holdings in top 5 EU MS in 2007 (in millions)



Source: Eurostat

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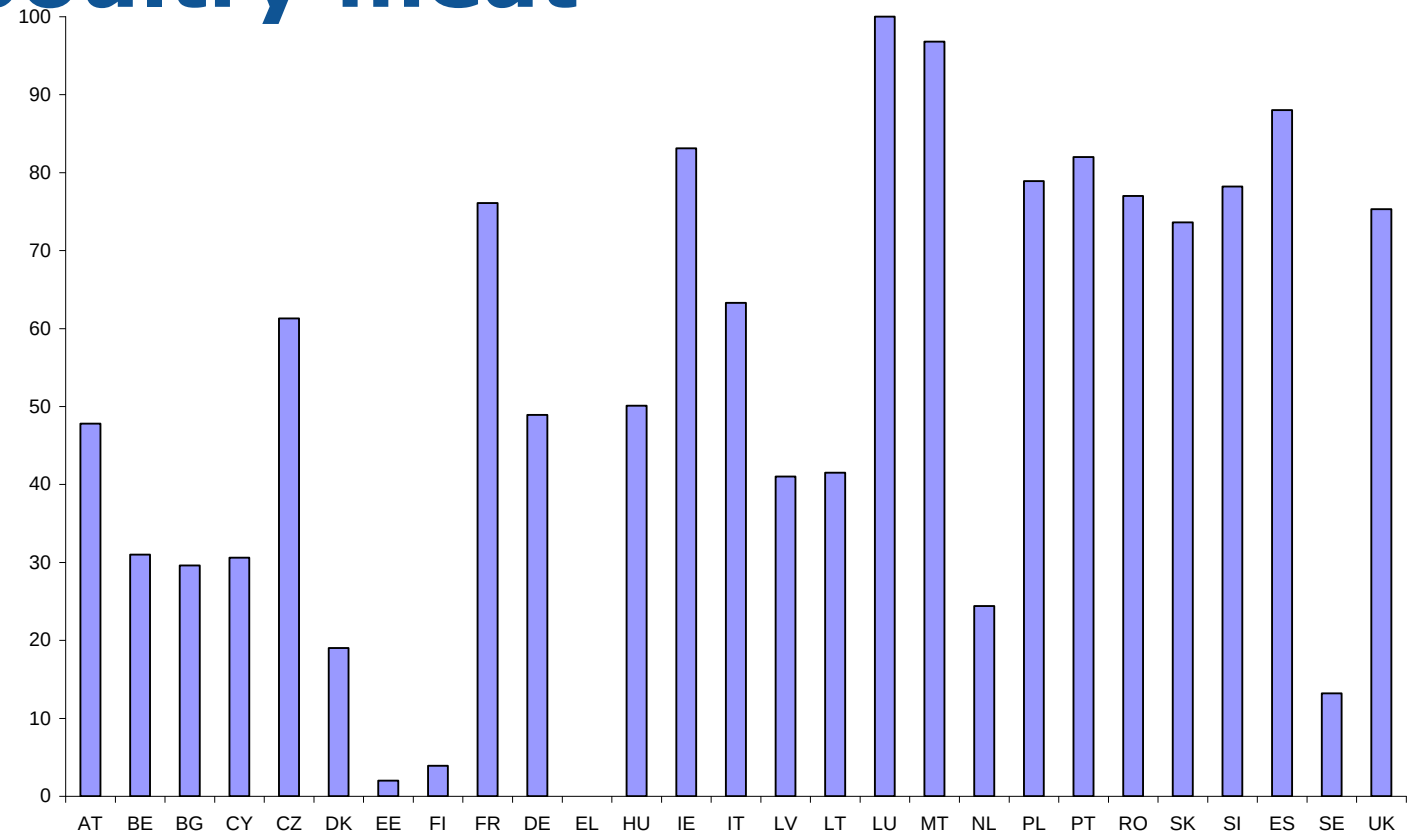
Prevalence of *Campylobacter* in poultry meat



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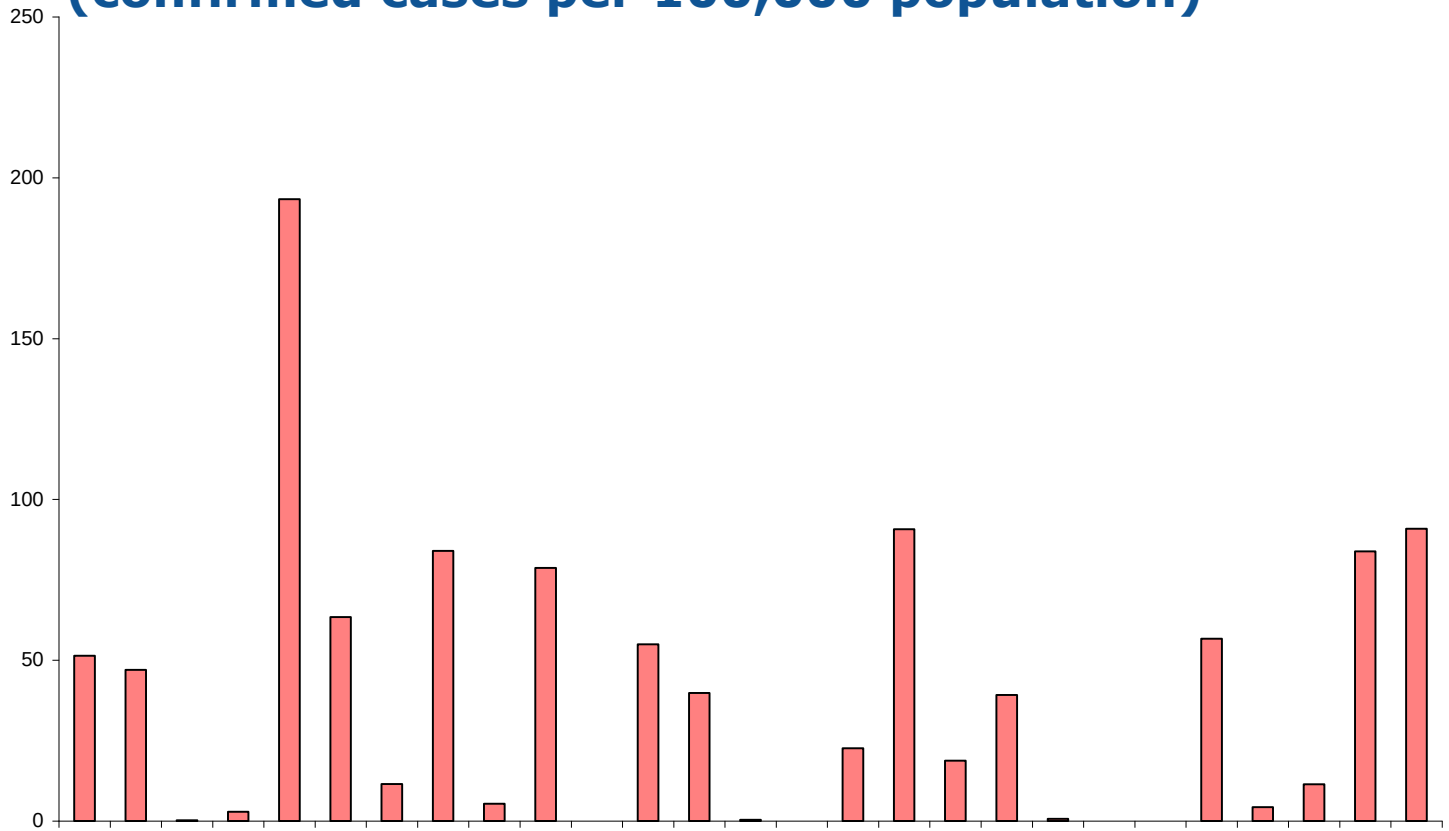
Human notification rate

(confirmed cases per 100,000 population)



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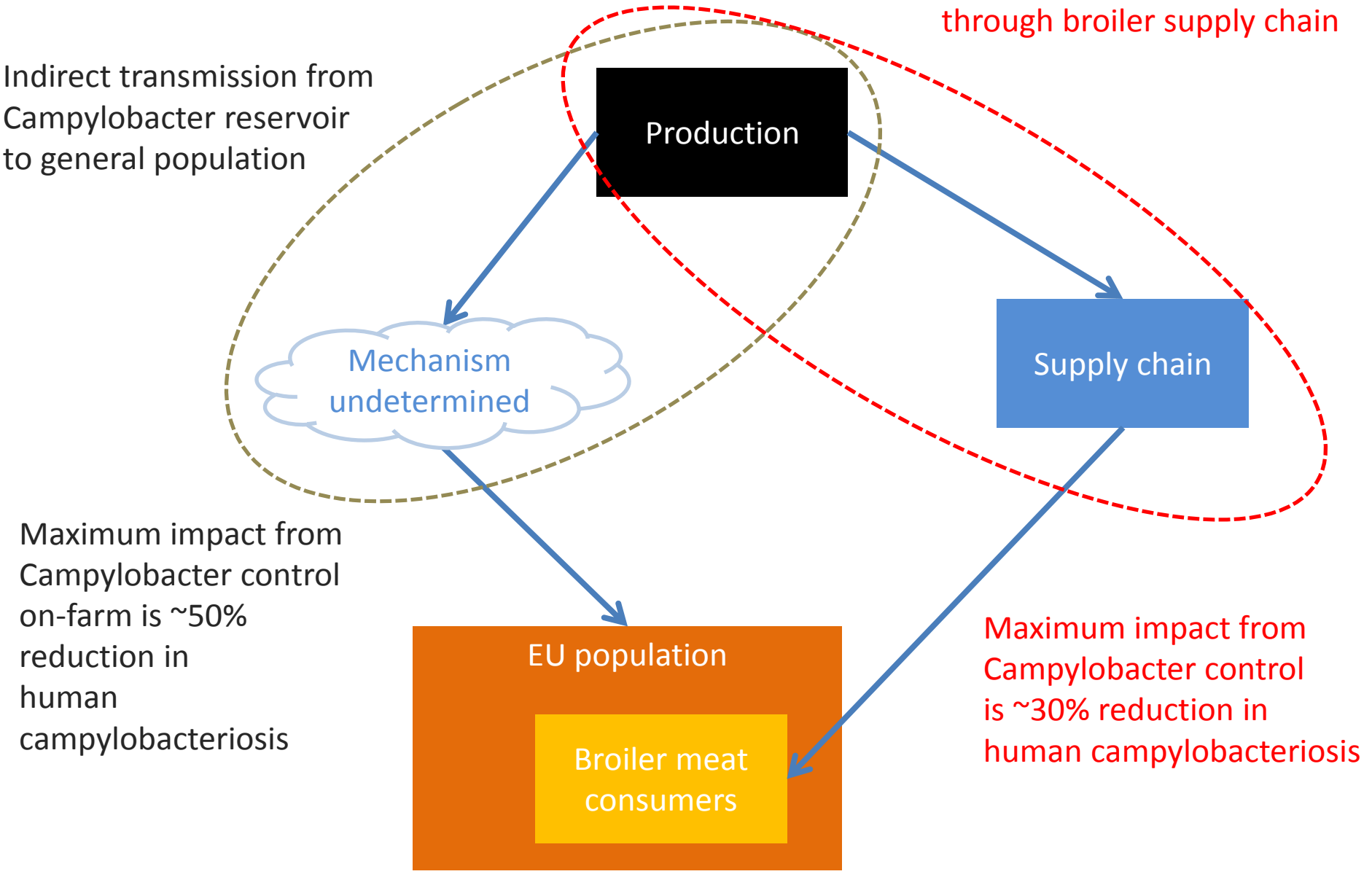
Transmission to consumers through broiler supply chain
Indirect transmission from Campylobacter reservoir to general population
Production
Mechanism undetermined
Supply chain
Maximum impact from Campylobacter control on-farm is ~50% reduction in human campylobacteriosis
EU population
Broiler meat consumers
Maximum impact from Campylobacter control is ~30% reduction in human campylobacteriosis

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Assumptions for the analysis

- *A new EU strategy for the control of Campylobacter in broilers would be based on targets of (a) a 50% and (b) a 90% reduction in human campylobacteriosis.*
- *Each human case of campylobacteriosis equates to 0.039 DALYs*
- *The cost of illness associated with each DALY is based on Mangen et al (2007)*
- *Intra-EU trade and external trade flows of fresh broiler meat are not accounted for.*

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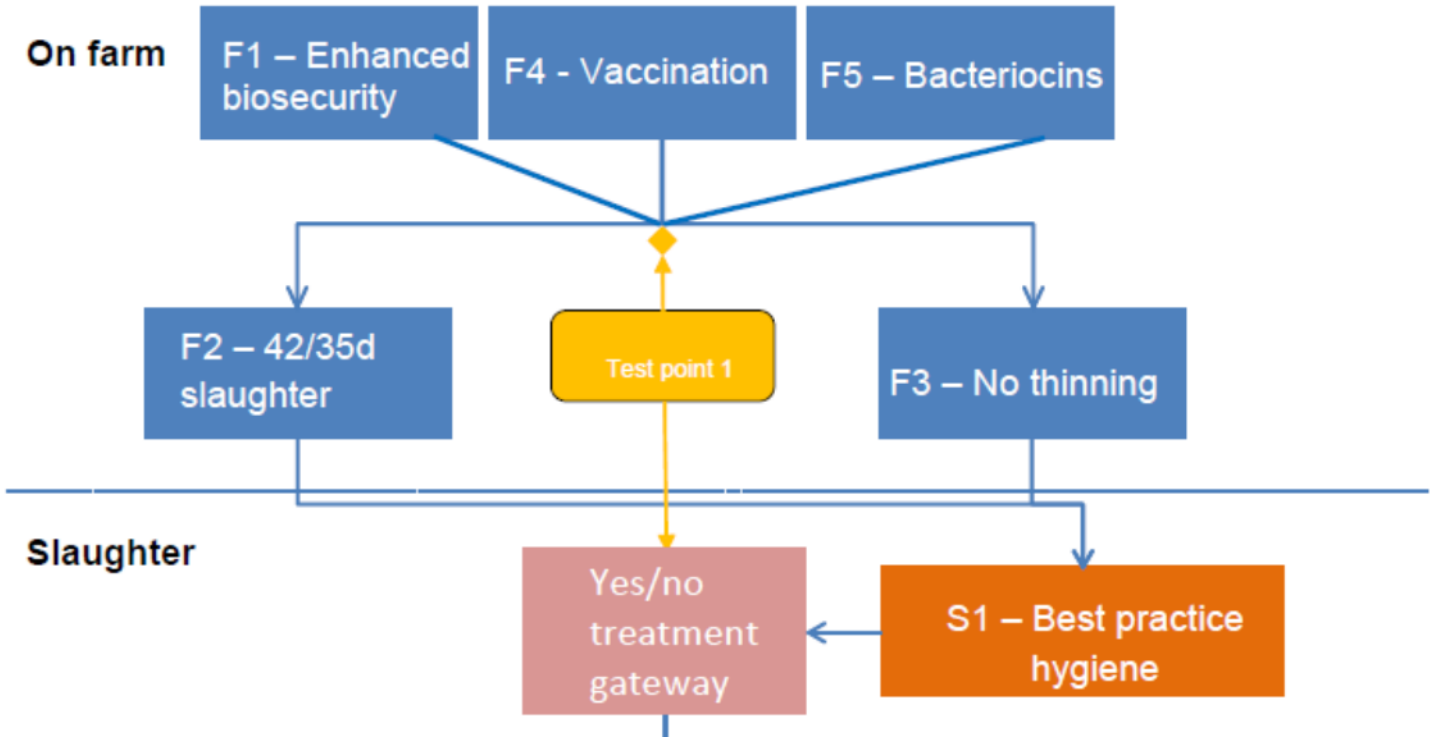
Control measures – on farm



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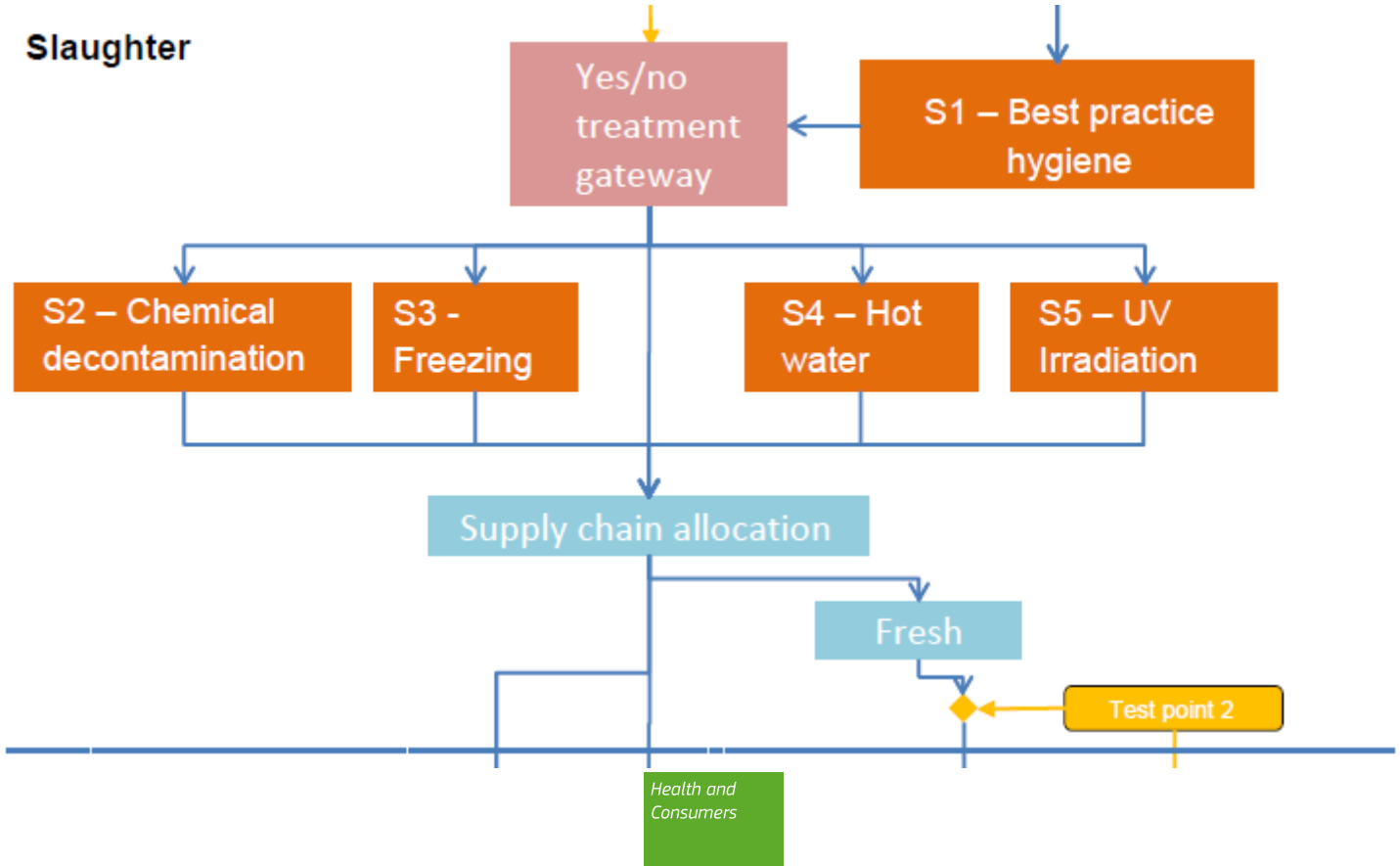
Control measures – at slaughter



Model design and structure - inputs

Member States		Control Measures											
Click in cells to turn methods on and off by member state. Click the icon below for more detail		Enhanced Biosecurity	Early Slaughter	No Thinning	Vaccination	Bacteriocins	On-farm Testing	Best practice hygiene	Chemical Decontamination	Freezing (2-3 weeks)	Hot Water	UV Irradiation	Post slaughter Testing
		F1	F2	F3	F4	F5	T1	S1	S2	S3	S4	S5	T2
Measure available to optimizer?													
Efficacy	L	40	10	10	50	50	N/A	20	40	90	50	100	N/A
	M	55	18	18	70	70	N/A	25	60	93	70	100	N/A
	H	70	25	25	90	90	N/A	30	80	95	90	100	N/A
Cost Adjustment	%	100	100	100	100	100	100	100	100	100	100	100	100
All Member States													
AT													
BE													
BG													
CY													
CZ													
DK													
EE													

Clickable grid that allows control measures to be turned on or off by MS, and also allows MS to be included or excluded from the analysis.

It also allows the level of efficacy of controls to be selected (High/Medium/low).

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Assessment of controls using the model

ID	Name	Reduction in incidence (%)	Cost per DALY avoided		Availability	Industry impact	Consumer impact
			Lower estimate	Upper estimate			
F1	Enhanced Biosecurity	40-70%	€474	€1,246			
F2	Early Slaughter	10-50%	€9,526	€35,724			
F3	No Thinning	10-25%	€1,914	€7,180			
F4	Vaccination	50-90%	€2,653	€7,162			
F5	Bacteriocins	50-90%	€2,714	€7,330			
S1	Best practice hygiene	20-30%	€1,487	€3,347			
S2	Chemical Decontamination	40-80%	€1,078	€3,235			
S3	Freezing (2-3 weeks)	90-95%	€2,710	€4,291			
S4	Hot Water	50-90%	€2,248	€6,068			
S5	UV Irradiation	100%	€2,536	€3,804			

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Cost-effectiveness of individual controls

ID	Name	Reduction in incidence (%)	EU cost of control € million	EU cost of illness saved € million	EU Net cost per DALY averted €
F1	Enhanced Biosecurity	44%	36.7	333.8	-6,102
F2	Early Slaughter	15%	288.1	116.1	10,154
F3	No Thinning	12%	43.6	87.4	-3,438
F4	Vaccination	64%	297.7	478.8	-2,594
F5	Bacteriocins	64%	297.7	478.8	-2,594
S1	Best practice hygiene	23%	54.0	166.1	-4,626
S2	Chemical Decontamination	60%	116.1	442.9	-5,060
S3	Freezing (2-3 weeks)	93%	346.5	682.9	-3,377
S4	Hot Water	70%	272.2	516.8	-3,245
S5	UV Irradiation	100%	341.3	738.2	-3,687

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Control strategies – 50% reduction

When the upper range efficacy values are used, only the farm biosecurity control F1 is selected. This is the most cost-effective option.

Table 8.4 Summary costs of *Campylobacter* control strategy CS1b

Control name and (efficacy %)	Reduction in EU incidence (%)	Annual cost per DALY avoided		Availability	Industry impact	Consumer impact
		Lower estimate	Upper estimate			
F1 Enhanced Biosecurity (70%)						
T1 On-farm Testing						
T2 Post slaughter Testing	56%	€581	€872			

Control strategies – 50% reduction

When the lower range efficacy values are used, Chemical Decontamination S2 is selected.

Control name and (efficacy %)	Reduction in EU incidence (%)	Annual cost per DALY avoided		Availability	Industry impact	Consumer impact
		Lower estimate	Upper estimate			
F1 Enhanced Biosecurity (40%)						
T1 On-farm Testing						
S2 Chemical Decontamination (40%)						
T2 Post slaughter Testing	59%	€1412	€2118			

Control strategies – 50% reduction

When all post slaughter controls are switched off (except Best Practice Hygiene) to avoid consumer impacts, F1 and S2 are selected in combination (mid-point efficacy).

Control name and (efficacy %)	Reduction in EU incidence (%)	Annual cost per DALY avoided		Availability	Industry impact	Consumer impact
		Lower estimate	Upper estimate			
F1 Enhanced Biosecurity (55%)	57%	€866	€1298			
T1 On-farm Testing						
S1 Best Practice Hygiene (25%)						
T2 Post slaughter Testing						

Control strategies – 90% reduction

With lower range values for control efficacy for all controls the model selects Enhanced Biosecurity (F1) and Freezing (S3); S3 comes in because of its relatively high efficacy value. This may have significant consumer impacts.

Control name and (efficacy %)	Reduction in EU incidence (%)	Annual cost per DALY avoided		Availability	Industry impact	Consumer impact
		Lower estimate	Upper estimate			
F1 Enhanced Biosecurity (40%)						
T1 On-farm Testing						
S3 Freezing (2-3 weeks) (90%)						
T2 Post slaughter Testing	93%	€1589	€2383			

Control strategies – 90% reduction

All post-slaughter controls were switched to force selection of farm level controls with lesser potential consumer impacts. F1 and S1 were set at the mid-point of the efficacy range while all other farm-level controls were set at the upper limit. Costs are very high but with technological advances it may be that F4 or F5 can be more cost effective when implemented widely

Control name and (efficacy %)	Reduction in EU incidence (%)	Annual cost per DALY avoided		Availability	Industry impact	Consumer impact
		Lower estimate	Upper estimate			
F1 Enhanced Biosecurity (55%)	92%	€2739	€4108			
F4 Vaccination (90%) OR F5 Bacteriocins (90%)						
T1 On-farm Testing						
S1 Best Practice Hygiene (25%)						
T2 Post slaughter Testing						

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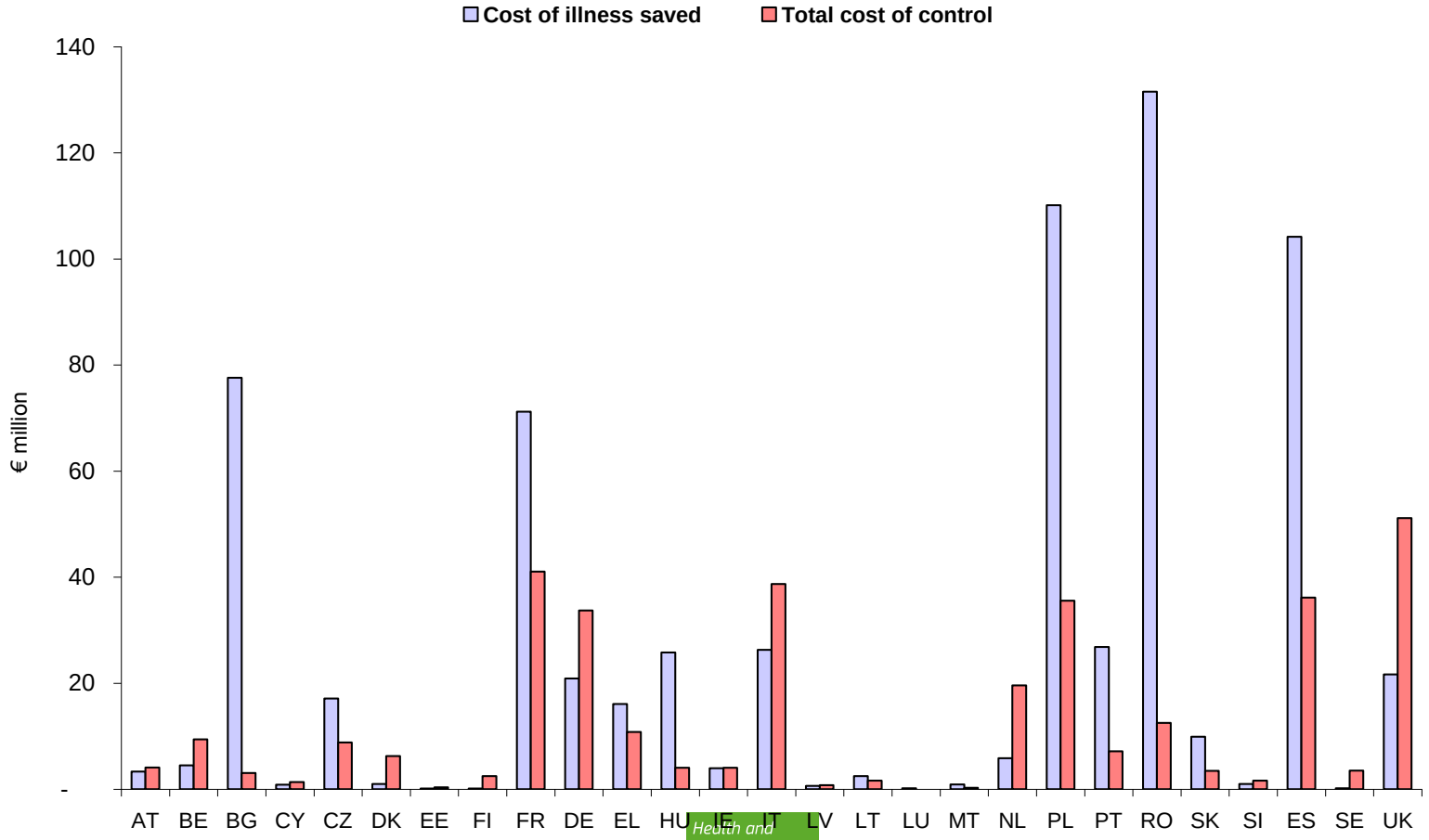
Distribution of costs and benefits



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Economic and social impacts

3 main impacts on economic growth:

- Additional costs: costs of the broiler meat production and processing sector, which may result in a reduction in the scale of production due to substitution by imports from third countries or a fall in the consumption of poultry meat.
- Improved health: Positive impact on economic growth through reduced absence from work and lower health costs associated with treating campylobacteriosis.
- Industry restructuring: The application of mandatory controls across Europe will create a shift in the relative competitiveness of MS in the production and processing of poultry meat. This would have differential impacts of economic growth in different MS.

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Distribution of costs and benefits by MS

- A number of countries (notably in Scandinavia) have a positive cost-utility ratio i.e. intervention costs exceed cost-of-illness (the effects of already introduced control measures are not considered)
- Where the number of human cases of campylobacteriosis is high, such as Poland, Romania and Spain, the case here for intervention is much stronger.

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Impact on trade

- Relate primarily to competitiveness i.e. cost of production relative to third country imports. However, improved food safety may stimulate demand for EU produced chicken, especially in the context of increased imports of fresh product.
- The use of freezing as a control should be tactical in order to maintain a fresh premium and avoid direct competition with imports.

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Conclusions

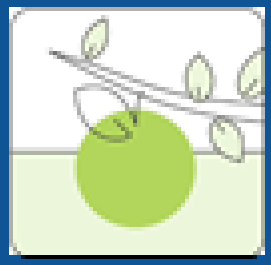
- The selection of controls is very sensitive to the assumptions on baseline adoption and potential uptake and cost of implementation. The values used in the model are very broadly based – mainly at EU level – and do not truly reflect MS conditions.
- The main impacts of Campylobacter control on economic growth relate to the imposition of additional costs on industry and the subsequent changes in the competitive position of the EU and third countries and between MS. On the other hand there are potentially positive economic impacts from reduced human illness on wellbeing and economies and from enhanced consumer confidence in fresh poultry meat.

Thank you very much for your attention!

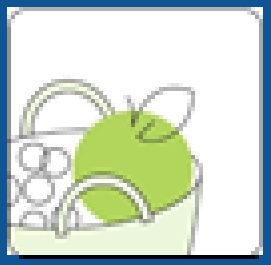
DG Health & Consumers

Europe working for healthier, safer, more confident citizens

Public Health



Food safety



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