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Cost benefit analysis of *Salmonella* control in slaughter pigs

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Summary

- The requested output
- Structure of the cost-benefit analysis
- Identification of potential sources of infection and possible intervention
- Costing of interventions
- Assessment of human health impacts
- Methodology issues
- Timeline

Brief*

- EFSA have estimated a 10% prevalence of salmonella in the lymph nodes of slaughter pigs across the EU
- The cost benefit analysis will assess a reduction in prevalence taking into account
 - Costs of interventions
 - Benefits in terms of human health
- Reducing mean prevalence by 50% and 90%
 - The target mean prevalence: 5% and 1%

Proposed structure of the cost-benefit analysis

- Development of a baseline European Pig sector model to include
 - Assessment of data on the structure of the pig sector in each country
 - Trade data to indicate linkages between countries for feed, animals and products and also with non-EU countries
 - Development of framework across the Union
 - Price data along the pig value chains
- Identification of critical pig systems and associated value chains

Proposed structure of the cost-benefit analysis

- Baseline estimates for the salmonella in pigs without State interventions
- Identification of the potential interventions
- Selection of a combination of interventions taking into account pig sector structure, timing of interventions
- Cost-benefit analysis of the interventions including human health costs and impacts

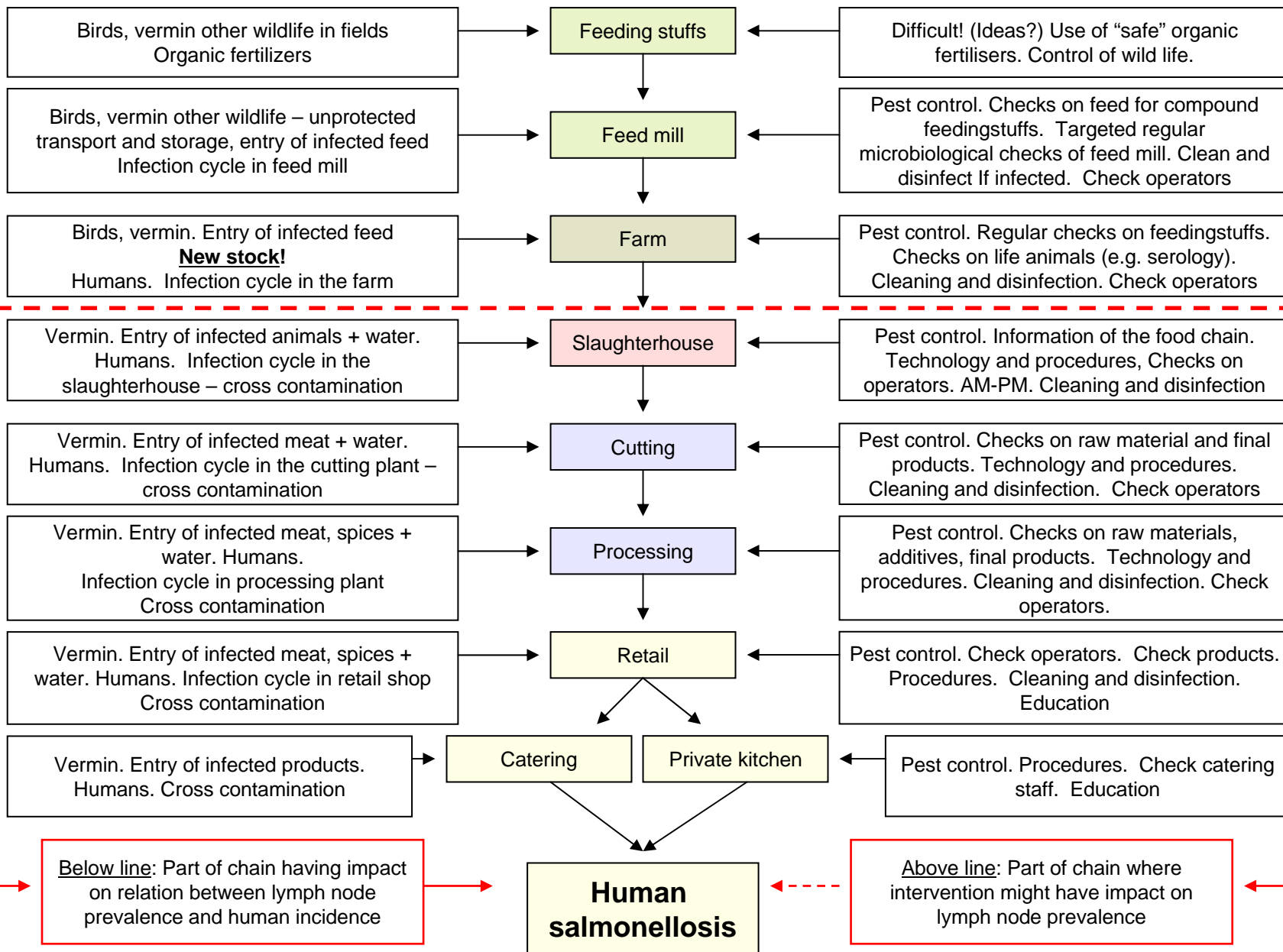
Initial data summary for the Member States

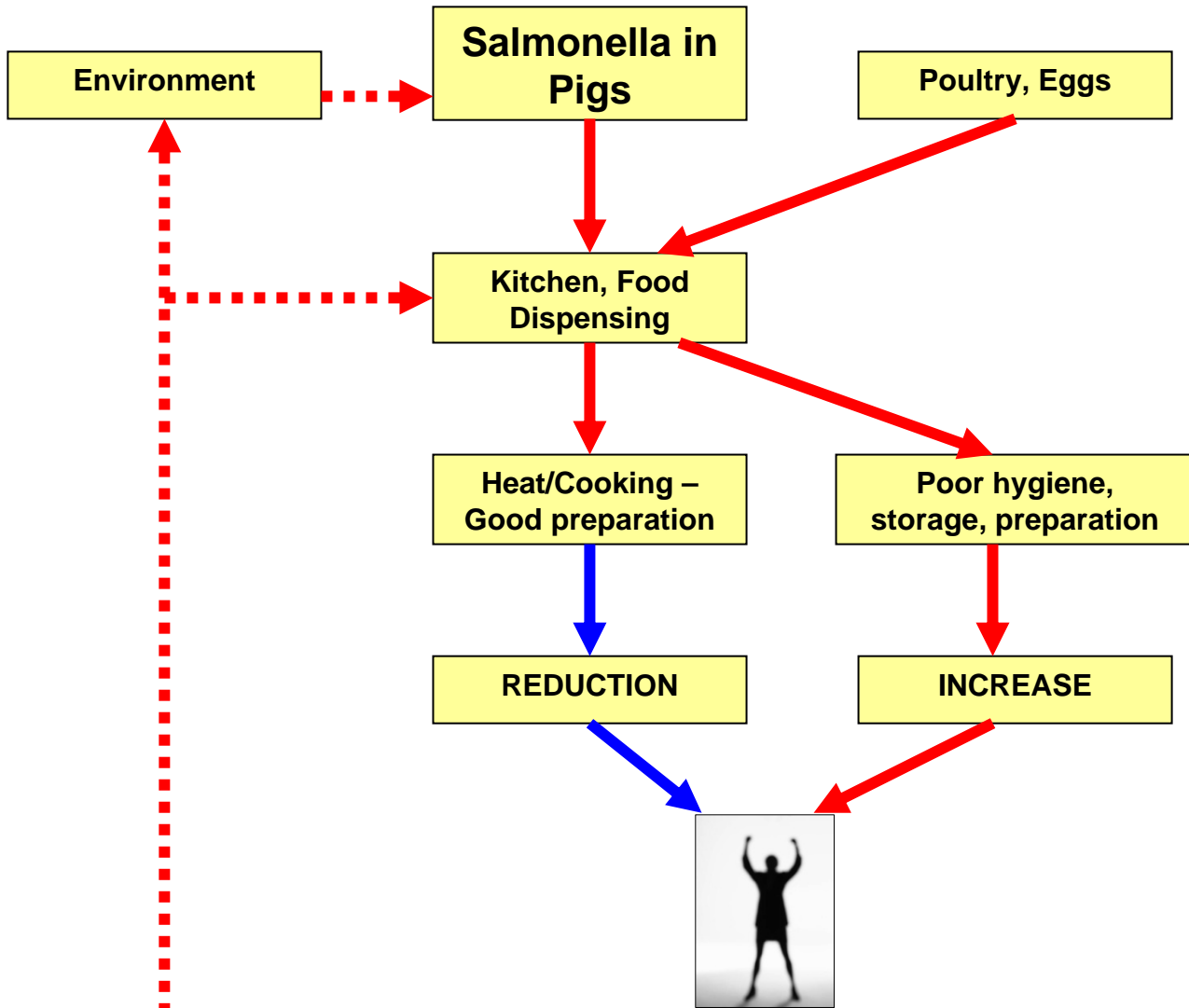
- Pig and human populations
- Pig meat production – total, per person, % of EU production
- Trade – import and export, self sufficiency
- Parameters – carcass weight, per capita production, offtake rate
- Salmonella – EFSA prevalence, % of burden of EU Salmonella per country
- (see annex and handout)

Potential sources of infection and possible interventions

Possible source of infection

Possible intervention





Intervention costs

Costing of individual interventions

- For each potential intervention a costing exercise will be carried out with contact with the people involved in the pig sector.
- Expert opinion will be sought where it is felt that the costs are too high or the interventions are unlikely to be adopted
- Questions will be asked what would make expensive and inconvenient interventions attractive
- The latter data will be included in terms of the costs that need to be considered by the State

Combination of interventions

- A list of the most likely interventions will be made based on the analysis of costs and potential for adoption within the scope agreed with EFSA and the Commission
- Using expert opinion within the team combinations of interventions will be defined for the different pig systems and their associated value chains
- Least cost combinations may be estimated, but this will be decided later in the project and will be depend on time available

Human health impact

Human Impact – Line of Enquiry

DISEASE

- Prevalence
- Incidence
- Age breakdown
 - Child, working age adult, older adults
- Investigate other measures, e.g. socio-economic status

Human Impact – Line of Enquiry

COSTS

- Direct costs to economic production:
 - Absence from work (illness, child care)
- Healthcare costs:
 - Primary care – visits to GP
 - Secondary care – admissions to hospital
- Indirect costs to industry:
 - Confidence, perceptions, market signals (price and volume of consumption)
- Market shocks??

Methodology

Methodological Issues

- Problem: attribution
 - from animal prevalence to human incidence
- Ideally:
 - 1% salmonella in pigs = X% salmonella in humans
 - Y cases in pigs = Z cases in humans
 - Cost per human case is £xx
 - Consider currencies, e.g. QALYs, DALYs

Set of currencies, resources:
Days absent
Volume healthcare interventions



Cost matrix for each member state

Scale Questions

- Burden of disease extrapolated here as:
prevalence x number of heads slaughtered
- 60% Cases of Salmonella in Slaughter Pigs:
 - 3 member states = France, Germany, Spain
- 84% Cases of Salmonella in Slaughter Pigs:
 - 7 Member states: + UK, Italy, Belgium, Denmark

Possible focuses of the work

- ~~Big hitters:~~
 - ~~Germany, Spain, France~~
 - ~~+ UK, Denmark, Italy, Belgium~~
- Ranked criteria:
 - 3 groups ranked by prevalence: high, medium, low (0% Finland)
 - 5 groups (quintiles) ranked by either prevalence or burden of disease (weighted prevalence)
- 4 groups following VLA
- 27 + Norway
 - Individual member states

In conclusion

Cost benefit analysis

- Baselines will be made for the pig sector and impacts on the human population for scenarios where there are no state interventions
- Benefits from the combinations of interventions will be estimated based on the change in pig sector and human health impact and comparing it with the baseline scenarios
- The sensitivity analysis will be performed to identify important parameters from the analysis

Timeline

- The initial phase of the project (months 1-6) will work on:
 - Pig sector analysis
 - Identification of interventions
 - Estimations of intervention costs and acceptability
- The second phase of the project (months 7-12) will work on:
 - Identification combinations of interventions
 - Costing of the combinations
 - Baseline development
- Third phase will focus on (months 13-18)
 - Cost benefit analysis

Acknowledgements

- EU
- Alex Park, ALC
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- Katharina Stärk, RVC

Annex – Full terms of reference

Full terms of reference

- The tender specifications require the undertaking of a cost-benefit analysis:
 - taking into account the criteria laid down in paragraph 6(c) of Article 4 of Regulation (EC) No 2160/2003 with regard to Salmonella, in particular:
 - i) its frequency in animal and human populations, feed and food;
 - ii) the gravity of its effects for humans;
 - iii) its economic consequences for animal and human health care and for feed and food businesses;
 - **iv) epidemiological trends in animal and human populations, feed and food;**
 - **v) scientific advice;**
 - vi) **technological developments**, particularly relating to the practicality of the available control options; and
 - vii) requirements and trends concerning breeding systems and production methods;

Full terms of reference (continued)

- use the outcome of the baseline survey on slaughter pigs as reference values to estimate the costs of respectively a 50% and 90% reduction of the mean prevalence at EU level, based on bacteriology of ileo-caecal lymph nodes over a period of 5-10 years;
- co-ordinate with the EFSA and its working group preparing an opinion concerning a quantitative risk assessment on Salmonella in slaughter and breeding pigs, in particular as regards the expected benefits and expected reduction by the most important control options. In this view the contractor should participate as an observer to at least 3 working group meetings in Parma (Italy) or elsewhere in the EU.

Annex – summarised pig sector data

	Pig Census (population)	% of EU Pig Population	Slaughtering in Tons	Production	Slaughtering in Heads	carcass weight (kg)	Heads Slaughtered Per Population	% Prevalence Salmonella	Extrapolation No. Heads Infected with Salmonella	% Burden of EU Salmonella
Year	2007		2008	2008	2008					
Belgie	6,200,300	4%	1,052,395	4.8%	11,150,849	94.38	1.80	13.9	1,549,968	4.4%
Bulgaria	865,300	1%	38,425	0.2%	572,117	67.16	0.66	16.7	95,543	0.3%
Czech Rep.	2,661,800	2%	288,356	1.3%	3,234,481	89.15	1.22	5.8	187,600	0.5%
Danmark	13,170,000	8%	1,699,967	7.7%	20,421,031	83.25	1.55	7.7	1,572,419	4.5%
Deutschland	26,948,100	17%	4,943,986	22.4%	52,923,965	93.42	1.96	10.9	5,768,712	16.4%
Eesti	374,700	0%	42,360	0.2%	535,388	79.12	1.43	4.7	25,163	0.1%
Ellas	1,038,000	1%	104,909	0.5%	1,681,098	62.40	1.62	24.8	416,912	1.2%
Espana	25,616,500	16%	3,470,474	15.7%	40,440,302	85.82	1.58	29.0	11,727,688	33.4%
France	14,968,000	9%	2,212,568	10.0%	24,907,481	88.83	1.66	18.1	4,508,254	12.9%
Ireland	1,574,600	1%	210,944	1.0%	2,667,956	79.07	1.69	16.1	429,541	1.2%
Italia	9,273,000	6%	1,669,317	7.6%	14,080,587	118.55	1.52	16.5	2,323,297	6.6%
Kypros	471,700	0%	58,198	0.3%	698,246	83.35	1.48	12.4	86,583	0.2%
Latvia	414,400	0%	40,018	0.2%	512,352	78.11	1.24	5.6	28,692	0.1%
Lietuva	923,100	1%	75,425	0.3%	948,966	79.48	1.03	1.8	17,081	0.0%
Luxembourg	86,400	0%	7,764	0.0%	117,512	66.07	1.36	22.4	26,323	0.1%
Magyarozag	3,860,000	2%	437,807	2.0%	4,717,205	92.81	1.22	9.3	438,700	1.3%
Malta	76,900	0%	10,344	0.0%	120,371	85.94	1.57		0	0.0%
Nederland	11,710,000	7%	1,343,763	6.1%	14,739,809	91.17	1.26	8.5	1,252,884	3.6%
Österreich	3,286,300	2%	494,235	2.2%	5,208,277	94.89	1.58	2.0	104,166	0.3%
Polska	17,621,200	11%	1,721,023	7.8%	20,287,703	84.83	1.15	5.1	1,034,673	3.0%
Portugal	2,345,000	1%	371,120	1.7%	5,631,759	65.90	2.40	23.4	1,317,832	3.8%
Roumania	6,644,700	4%	416,032	1.9%	5,183,571	80.26	0.78		0	0.0%
Slovenia	542,600	0%	31,275	0.1%	370,625	84.38	0.68	4.8	17,790	0.1%
Slovakia	951,900	1%	88,555	0.4%	954,439	92.78	1.00	6.2	59,175	0.2%
Suomi	1,426,800	1%	206,334	0.9%	2,313,505	89.19	1.62	0.0	0	0.0%
Sverige	1,727,500	1%	248,822	1.1%	2,803,894	88.74	1.62	1.3	36,451	0.1%
U.K.	4,674,000	3%	756,152	3.4%	9,638,390	78.45	2.06	21.2	2,043,339	5.8%
Eur 27	159,452,800	100%	22,040,567	100.0%	246,861,879	89.28	1.55	10.3	25,426,773	
								14%	35,068,785	100%

relates to sum total, not average

Population (People)	Kilo per capita slaughtered	Total Consumption 2007 (000 Ton)	Per capita consumption (kg)	Self Sufficiency (net production as % of consumption)	% +Import, (-) Export	
10,666,866	99	521	47.5	206.2	-106	Belgium
7,640,238	5	116	15.2	35.5	+65	Bulgaria
10,430,100	28	425	41.7	84.8	+15	Czech Republic
5,482,266	310	258	47.3	699.2	-599	Denmark
82,218,000	60	4528	54.8	110.1	-10	Germany
1,340,935	32	43	32.6	87.0	+13	Estonia
11,125,179	9	299	26.8	40.7	+59	Greece
46,063,511	75	2936	66.0	119.7	-20	Spain
64,473,140	34	2231	36.2	102.3	-2	France
4,339,000	49	194	45.2	105.8	-6	Ireland
59,619,290	28	2440	41.4	65.7	+34	Italy
778,700	75	52	60.8	105.8	-6	Cyprus
2,266,000	18	60	26.6	66.8	+33	Latvia
3,357,873	22	140	41.3	70.9	+29	Lithuania
483,800	16					Luxembourg
10,036,000	44	491	49.0	101.7	-2	Hungary
407,810	25	20	50.1	39.3	+61	Malta
16,471,968	82	972	59.1	132.7	-33	Netherlands
8,340,924	59	521	62.3	101.8	-2	Austria
38,115,641	45	2069	54.3	101.1	-1	Poland
10,599,095	35	509	47.9	71.5	+29	Portugal
21,538,000	19	661	30.8	74.4	+26	Romania
2,025,866	15	50	24.9	66.6	+33	Slovenia
5,400,998	16	124	23.0	91.9	+8	Slovakia
5,312,415	39	208	39.3	102.8	-3	Finland
9,208,034	27	335	36.8	79.0	+21	Sweden
61,003,875	12	1578	26.0	46.8	+53	UK
498,745,524	44	21,781	43.9	106	-6	