Variable name	Type	Units	Initial	Equation	Source	Important	Submod
chickens arriving from hatcheries	Flow	Chicken/Week	na	population*(consumption rate per person/meat per chicken)	Model conceptualization	Demand = supply	Chicken
chicken on farms	Stock	Chicken	Initial Chickens on Farms	chickens arriving from hatcheries-chicken infections with CPY-"chicken non-infections with CPY"	Model conceptualization		Chicken
initial chickens on	Constant	Chicken	na	100000	Model conceptualization	Arbitrary number	Chicken
CPY-positive chickens	Stock	Chicken	0	chicken infections with CPY-"CPY-positive chickens slaughtered"	Model conceptualization		Chicken
chicken infections with CPY	Flow	Chicken/Week	na	chickens on farms*rate of chicken infection from environment	Model conceptualization		Chicken
chicken non-infections with	Flow	Chicken/Week	na	chickens on farms*(1-rate of chicken infection from environment)	Model conceptualization		Chicken
CPY-negative chickens	Stock	Chicken	0	chicken non-infections with CPY-"slaughtering with cross-contamination"-"slaughtering without cross-contamination"	Model conceptualization	contamination before slaughtering	Chicken
slaughtering without cross-	Flow	Chicken/Week	na	CPY-negative chickens * (1-"rate of cross-contamination")	Model conceptualization		Chicken
slaughtering with cross-	Flow	Chicken/Week	na	CPY-negative chickens * "rate of cross-contamination"	Model conceptualization		Chicken
contaminated meat	Stock	kg	0	("CPY-positive chickens slaughtered"+"slaughtering with cross-contamination")*meat per chicken-contaminated meat consumption	Model conceptualization		Chicken
CPY-positive chickens	Flow	Chicken/Week	na	CPY-positive chickens*slaughter rate	Model conceptualization	All infected chicken become	Chicken
rate of cross-contamination	Variable	1/Week	na	IF THEN ELSE(safe slaughtering policy = 1, ((ZIDZ("CPY-positive chickens",("CPY-negative chickens"+"CPYpositive chickens")))*CPY reproductive number in chickens)*0.8 , (ZIDZ("CPY-positive chickens",("CPY-negative chickens"+"CPY-positive chickens")))*CPY reproductive number in chickens)	Model conceptualization	Depends on the proportion of infected chicken	Chicken
meat per chicken	Constant	Kg/Chicken	na	1,5	Denton & Miller, 1988; National Chicken Council		Chicken
contaminated meat consumption	Flow	Kg/Week	na	MIN(proportion of contaminated meat * consumption rate per person * population, (contaminated meat/week))	Model conceptualization	Cannot consume more than there is available	Chicken
total chickens slaughtered	Variable	Chicken/Week	na	CPY-positive chickens slaughtered+"slaughtering with cross-contamination"+"slaughtering without cross-contamination"	Model conceptualization		Chicken

contaminated slaughtered	Variable	Chicken/Week	na	CPY-positive chickens slaughtered+"slaughtering with cross-contamination"	Model conceptualization		Chicken
Proportion of contaminated	Variable	Dmnl	na	ZIDZ(contaminated slaughtered chickens,total chickens slaughtered)	Model conceptualization		Chicken
slaughter rate	Constant	1/Week	na	0,3	Calibration		Chicken
proportion of CPY-positive chickens	Variable	Dmnl	na	ZIDZ("CPY-positive chickens", "CPY-positive chickens"+"CPY-negative chickens")	Model conceptualization		Chicken
consumption rate per person	Constant	kg/(Week*Person)	na	0.203+meat consumption behaviour	/app/uploads/2020/10/20151422/2020-078-Vleesconsumptie-2019-WUR-		Chicken
population	Variable	Person	na	population by 2020 + RAMP((projected population by 2050-population by 2020)/(weeks per year*30),0,weeks per year*30)	Model conceptualization		Chicken
week	Constant	Week	na	1	Common sense		Chicken
CPY reproductive	Constant	1/Week	na	0.5	Parshotam, 2011		Chicken
Infections per kg of meat	Variable	Cases/kg	na	IF THEN ELSE(food safety policy=1, 0.8*5e-05, 5e-05)	Calibration		Cost of Illness
CPY Cases	Stock	Cases	0	human CPY infections-asymptomatic infections-symptomatic infections	Model conceptualization		Cost of Illness
human CPY infections	Flow	Cases/Week	na	(contaminated meat consumption*infections per kg of meat consumed)+rate of human infection from environment	Model conceptualization		Cost of Illness
Acute GE Cases	Stock	Cases	0	symptomatic infections-Death by CPY-GBS development-GE Recovery-IBD development-ReA development	Model conceptualization		Cost of Illness
symptomatic infections	Flow	Cases/Week	na	(CPY Cases*rate of symptomatic cases)*(PULSE TRAIN(weeks per year, TIME STEP, weeks per year , FINAL TIME)) / TIME STEP	Model conceptualization		Cost of Illness
base rate of	Constant	Dmnl	na	0,88	Medema et al.		Cost of
rate of symptomatic	Variable	Dmnl	na	base rate of symptomatic cases*rate of symptomatic cases modifier	Model conceptualization		Cost of Illness
asymptomatic infections	Flow	Cases/Week	na	(CPY Cases*(1-rate of symptomatic cases))*(PULSE TRAIN(weeks per year, TIME STEP, weeks per year , FINAL TIME)) / TIME STEP	Model conceptualization		Cost of Illness
GE Recovery	Flow	Cases/Week	na	recovery rate*Acute GE Cases	Model conceptualization		Cost of
recovery rate	Constant	1/Week	na	0,98125	Mangen et al.		Cost of
ReA Cases	Stock	Cases	0	ReA development	Model conceptualization	Chronic disease,	Cost of
GBS Cases	Stock	Cases	0	GBS development	Model conceptualization	Chronic disease,	Cost of
IBD Cases	Stock	Cases	0	IBD development	Model conceptualization	Chronic disease,	Cost of

Death by CPY	Flow	Cases/Week	na	Acute GE Cases*death rate		Model conceptualization	burden/cost of illness associated with deaths accounted for	Cost of Illness
ReA development	Flow	Cases/Week	na	Acute GE Cases*ReA rate		Model conceptualization	chronic disease assumed to all occur subsequent to acute cases. In reality, some campylobacter	Cost of Illness
GBS development	Flow	Cases/Week	na	Acute GE Cases*GBS rate		Model conceptualization		Cost of
IBD development	Flow	Cases/Week	na	Acute GE Cases*IBD rate		Mangen et al.		Cost of
ReA rate	Constant	1/Week	na		0,0175	Mangen et al.		Cost of
GBS rate	Constant	1/Week	na		0,00075	Mangen et al.		Cost of
IBD rate	Constant	1/Week	na		0,000125	Mangen et al.	account for increase in diagnosis of IBD over past 2 decades: https://www.cdc.gov/ibd/data-statistics.htm#:~:t	Cost of Illness
death rate	Constant	1/Week	na		0,000375	Mangen et al.	death only caused by acute symptoms, death from chronic cases	Cost of Illness
DALY	Variable	DALY	na	(recovered GE*DALYs per GE Case) + (GBS Cases*DALYs per GBS Case) + (IBD Cases*DALYs per IBD Case) + (ReA Cases*DALYs per ReA Case)		Model conceptualization		Cost of Illness
Cost of Illness	Variable	Euro	na	((recovered GE*COI per GE Case) + (GBS Cases*COI per GBS Case) + (IBD Cases*COI per IBD Case) + (ReA Cases*COI per ReA Case))*COI modifier		Model conceptualization		Cost of Illness
COI modifier	Constant	Dmnl	na		1	Model conceptualization	Used only to test	Cost of
DALYs per GE	Constant	DALY/Cases	na		0,008	Mangen et al.	All undiscounted	Cost of
DALYs per ReA	Constant	DALY/Cases	na		0,09	Mangen et al.	All undiscounted	Cost of
DALYs per GBS	Constant	DALY/Cases	na		5	Mangen et al.	All undiscounted	Cost of
DALYs per IBD	Constant	DALY/Cases	na		11,6	Mangen et al.	All undiscounted	Cost of
COI per GE Case	Constant	Euro/Cases	na		190	Mangen et al.		Cost of
COI per ReA Case	Constant	Euro/Cases	na		20	Mangen et al.		Cost of
COI per GBS Case	Constant	Euro/Cases	na		85000	Mangen et al.		Cost of
COI per IBD Case	Constant	Euro/Cases	na		173000	Mangen et al.		Cost of

Recovered GE	Stock	Cases		0	GE Recovery	Model conceptualization		Cost of
weeks per year	Constant	Week	na		52	This is how time works.		Cost of
consumer food consumption behaviour lever	Variable	Dmnl	na	IF THEN ELSE((known CPY cases/population) > consumer food consumption behaviour threshold , 1 , 0)		Model conceptualization	consumption 1 - Reduced consumption due	Cost of Illness
consumer food consumption	Constant	Cases/Person	na		0,0038	Own interpretation		Cost of Illness
time to know	Constant	Week	na		1	Own interpretation		Cost of
known CPY cases	Variable	Cases	na	SMOOTH N(CPY Cases,time to know about CPY cases, CPY Cases, 3)		Model conceptualization		Cost of Illness
meat consumption behaviour	Variable	kg/(Week*Person)	na	IF THEN ELSE(((consumer food consumption behaviour lever + consumption behaviour policy) = 0), 0 , -0.05)		Model conceptualization	behavior and government intervention to	Cost of Illness
rate of symptomatic	Variable	Dmnl	na	WITH LOOKUP (scenario switch): ([(0,0)-(12,2)],(0,1),(9,1),(10,0.9),(11,1.1),(12,1.1))		Mangen et al.	Ranges from 0.9 to 1.1 across	Cost of Illness
fly population	Stock	MFly	initial fly	fly development-fly deaths		Model conceptualization		Environ
fly deaths	Flow	MFly/Week	na	DELAY1I(fly development, fly lifetime, fly population/fly lifetime)		Model conceptualization		Environ mental
fly development	Flow	MFly/Week	na	fly development rate		Model conceptualization		Environ
Initial fly	Constant	MFly	na		0,1	Model conceptualization		Environ
fly lifetime	Constant	Week	na		4	https://www.orkin.com/flies/how-long-do-flies-live		Environ mental
fly population growth per degree	Constant	MFly/(degree*Week)	na		0,0024	(1997). Effects of temperature on growth, development and diapause in the yellow dung fly - against all the		Environ mental
base fly population development rate	Constant	MFly/Week	na		-0,0091	(1997). Effects of temperature on growth, development and diapause in the yellow dung fly - against all the		Environ mental
non-diapause development rate	Variable	MFly/Week	na	base fly population development rate + fly population growth per degree* temperature		(1997). Effects of temperature on growth, development and diapause in the yellow dung fly - against all the		Environ mental
diapause development rate	Constant	MFly/Week	na		0,0005	(1997). Effects of temperature on growth, development and diapause in the yellow dung fly - against all the		Environ mental

fly development rate	Variable	MFly/Week	na	IF THEN ELSE(temperature > 4, "non-diapause development rate" ,diapause development rate)	(1997). Effects of temperature on growth, development and diapause in the yellow dung fly - against all the	Below 4 degrees fly development enters diapause	Environ mental
temperature	Variable	degree	na	((-1)*(SIN(2*pi*(Time+start of year offset)/weeks per year))*((maximum average weekly temperature-minimum average weekly temperature)/2)+((maximum average weekly temperature+minimum average weekly temperature)/2))+temperature increase	Model conceptualization		Environ mental
minimum average weekly	Variable	degree	na	-4	KNMI		Environ mental
maximum average weekly	Variable	degree	na	23	KNMI		Environ mental
pi	Constant	Dmnl	na	ARCCOS(-1)	Archimedes of Syracuse		Environ
proportion of infectious flies	Variable	Dmnl	na	base infectious flies + "chance of chicken-to-fly transmission"* "proportion of CPY-positive chickens"	Model conceptualization		Environ mental
chance of chicken-	Constant	Dmnl	na	0.5	Calibration		Environ
base infectious	Constant	Dmnl	na	0.35	Calibration		Environ
infectious flies	Variable	MFly	na	fly population*proportion of infectious flies * IF THEN ELSE(fly population control policy = 1 ,0.8 ,1)	Model conceptualization		Environ mental
rate of chicken infection from	Variable	1/Week	na	base chicken exposure rate+(infectious flies*rate of chicken exposure to infectious flies)	Model conceptualization		Environ mental
human infection from environment	Variable	Cases/Week	na	infectious flies*rate of human exposure to infectious flies*population + (infection risk from birds * population)	Model conceptualization		Environ mental
base chicken	Constant	1/Week	na	0.1	Calibration		Environ
chicken exposure	Variable	1/(MFly*We	na	2	Calibration		Environ
rate of human exposure to infectious flies	Variable	Cases/(MFly *Person*We ek)	na	base human exposure rate * SMOOTH(IF THEN ELSE(exposure control policy = 1 , 0.8 , 1) , number of weeks needed to adopt policy)	Model conceptualization		Environ mental
base human exposure rate	Constant	Cases/(MFly *Week*Pers	na	0.001	Calibration		Environ mental
average temperature	Variable	degree	na	RAMP(temperature increase by 2050/(weeks per year*30),0,weeks per year*30)	Model conceptualization		Environ mental
temperature switch	Variable	Dmnl	na	WITH LOOKUP (scenario switch):([(0,0)-(12,2)],(0,0),(7,0),(8,2),(9,1),(10,0),(11,0),(12,2))	Model conceptualization	1 - Linear change 2 - Faster summer warming than winter warming	Environ mental

temperature increase	Variable	degree	na	IF THEN ELSE(temperature switch = 0,0,(IF THEN ELSE(temperature switch = 2,(-1)*(SIN(2*pi*(Time+start of year offset)/weeks per year)*0.8*average temperature increase)+average temperature increase,average temperature increase)))	Bresser et al, 2006		Environ mental
temperature increase by 2050	Constant	degree	na	WITH LOOKUP (scenario switch): ([(0,0)-(12,2)],(0,1.5),(3,1.5),(4,1),(5,1.5),(6,1.5),(7,1.5),(8,2),(9,1.5),(11,1.5),(12,2))	KNMI 14' klimaatscenario's voor Nederland	Ranges from 1 to 2 across the different scenarios	Environ mental
Infection risk from birds	Constant	Cases/(Week*Person)	na	2.5E-0.5	Calibration		Environ mental
start of year offset	Variable	Week	na	8	KNMI	the sinusoidal curve for the temperature to	Environ mental
population by	Constant	Person	na	1,73E+07	CBS		Environ
projected population by 2050	Variable	Person	na	WITH LOOKUP (scenario switch): ([(0,0)-(12,3e+07)],(0,1.94e+07),(1,1.94e+07),(2,2.16e+07),(3,1.71e+07),(4,1.94e+07),(11,1.94e+07),(12,2.16e+07))	(https://www.cbs.nl/en-gb/news/2020/51/forecast-population-growth-unabated-in-the-next-50-	Ranges from 1.71e+07 to 2.16e+07 across scenarios	Environ mental
exposure control policy	Variable	Dmnl	na	IF THEN ELSE(exposure control policy switch = 1, IF THEN ELSE(temperature > temperature trigger for exposure control policy, 1 , 0), 0)	Policy conceptualization		Policies
temperature trigger for	Constant	degree	na	20	Policy conceptualization		Policies
exposure control policy switch	Constant	Dmnl	na	0	Policy conceptualization	0 - No policy 1 - Policy	Policies
number of weeks needed to adopt	Constant	Week	na	2	Policy conceptualization		Policies
fly population control policy	Variable	Dmnl	na	IF THEN ELSE(population control policy switch = 1, IF THEN ELSE(temperature > temperature trigger for fly population control policy , 1 , 0), 0)	Policy conceptualization		Policies
temperature trigger for fly	Constant	degree	na	20	Policy conceptualization		Policies
population control policy	Constant	Dmnl	na	0	Policy conceptualization	0 - No policy 1 - Policy	Policies
safe slaughtering policy	Variable	Dmnl	na	IF THEN ELSE(safe slaughtering policy switch = 1, IF THEN ELSE(Cost of Illness-COI accumulated a year ago > COI trigger for slaughtering policy , 1 , 0), 0)	Policy conceptualization		Policies
COI trigger for	Constant	Euro	na	1,50E+07	Policy conceptualization		Policies
safe slaughtering policy switch	Constant	Dmnl	na	0	Policy conceptualization	0 - No policy 1 - Policy	Policies

consumption behaviour policy	Variable	Dmnl	na	IF THEN ELSE(consumption behaviour policy switch = 0, 0 , IF THEN ELSE ((Cost of Illness-COI accumulated a year ago)<COI trigger for consumption behaviour policy,0, (PULSE(weeks per year,1500)*1)))		Policy conceptualization		Policies
COI accumulated	Level	Euro	na	DELAY FIXED (Cost of Illness, weeks per year,0)		Policy conceptualization		Policies
COI trigger for consumption	Constant	Euro	na		2,20E+07	Policy conceptualization		Policies
consumption behaviour policy	Constant	Dmnl	na		0	Policy conceptualization	0 - No policy 1 - Policy	Policies
food safety policy	Variable	Dmnl	na	IF THEN ELSE(food safety policy switch = 1, IF THEN ELSE(Cost of Illness-COI accumulated a year ago > COI trigger for food safety policy , 1 , 0), 0)		Policy conceptualization		Policies
COI trigger for	Constant	Euro	na		1,50E+07	Policy conceptualization		Policies
food safety policy switch	Constant	Dmnl	na		0	Policy conceptualization	0 - No policy 1 - Policy	Policies