Supplemental Information

Table Lists:

Table S1. Probabilistic distributions representing uncertainty in model input for livestock source.

Sub-category	Model Inputs	Distribution Type	Fitted Distribution Parameters	
			Para1	Para2
Yellow cattle	*EF*	Uniform	18.07	25.61
Buffalo	*EF*	Lognormal	2.38	0.16
Dairy	*EF*	Lognormal	3.36	0.15
Beef cattle	*EF*	Uniform	6.81	22.31
Goat	*EF*	Gamma	15.51	0.19
Sow	*EF*	Gamma	3.36	3.09
Hog	*EF*	Uniform	1.58	5.84
Hen	*EF*	Normal	0.34	0.09
Broiler	*EF*	Weibull	0.27	4.74
Laying duck	*EF*	Normal	0.29	0.15
Duck	*EF*	Gamma	2.43	0.01
Goose	*EF*	Weibull	0.74	1.34
Pigeon	*EF*	Normal	0.006	0.003
Rabbit	*EF*	Lognormal	-1.33	0.19

Note: *Para1*: the mean for *Normal*, the mean of *lnx* for *Lognormal*, the left endpoint for *Uniform*, the scale parameters for *Gamma* and *Weibull* distribution.

Para2: the standard deviation for *Normal*, the standard deviation of *lnx* for *Lognormal*, the right endpoint for *Uniform*, the shape parameter for *Gamma* and *Weibull* distributions.

EF: emission factor for each sub-category of livestock.

Table S2. Probabilistic distributions representing uncertainty in model inputs for the biomass burning source.

Sub-category	Model Inputs	Distribution Type	Fitted Distribution Parameters	
			Para1	Para2
Field burning of rice straw	N	Weibull	1.22	3.37
	D_1	Normal	0.88	0.03
	B	Beta	17.39	36.99
	F	Normal	0.91	0.03
	$EF_{rice\ straw}$	Uniform	0.26	1.33
Domestic biofuel burning	$EF_{crop\ residues}$	Weibull	1.19	3.96
	EF_{wood}	Weibull	1.29	3.29
Forest fire	D_2	Normal	199.97	21.96
	F	Gamma	11.63	0.03
	$EF_{forest\ fire}$	Gamma	2.98	0.49

Note: *Para1:* the mean for *Normal*, the mean of *lnx* for *Lognormal*, the left endpoint for *Uniform*, the scale parameters for *Gamma* and *Weibull* distribution, the shape parameter for *Beta* distribution.

Para2: the standard deviation for *Normal*, the standard deviation of *lnx* for *Lognormal*, the right endpoint for *Uniform*, the shape parameter for *Gamma*, *Weibull* and *Beta* distribution.

N: production-to-residue ratio.

D$_1$: dry matter fraction.

D$_2$: aboveground biomass density.

B: percentage of crop residues that are burned in the field.

F: burning efficiency ratio.

EFrice straw: emission factor of rice straw open burning.

EFcrop residues: emission factor of domestic crop residues combustion.

EFwood: emission factor of domestic woody fuel combustion.

EFforest fire: emission factor of forest fire.

Table S3. Correlation coefficients between source-based emissions and the total emissions.

Emission sources	Correlation coefficients	Emission sources	Correlation coefficients
yellow cattle	0.005	field straw burning-rice	0.000
buffalo	0.010	field straw burning-soybeans	0.003
dairy	0.007	field straw burning-sugarcane	0.020
beef cattle	0.024	field straw burning-peanut	0.014
goat	-0.008	field straw burning-cassava	-0.014
sow	0.072	field straw burning-tobacco leaf	0.030
hog	0.545	field straw burning-vegetable	0.052
hen	0.019	domestic crop residue	0.022
broiler	0.545	domestic firewood	0.005
laying duck	-0.021	forest fire	-0.028
duck	0.072	sewage Treatment	0.045
goose	0.543	waste incineration	0.037
pigeon	-0.012	waste landfill	0.059
rabbit	0.012	industrial coal combustion	0.200
N fertilizer application	0.220	industrial heavy oil combustion	0.002
N fertilizer production	0.026	industrial diesel combustion	0.026
human breath	-0.014	industrial gas combustion	0.032
human sweat	0.060	domestic coal combustion	-0.016
urban human excretion	0.025	domestic gas combustion	-0.018
rural human excretion	0.030	domestic oil combustion	-0.013