

# A study on the use of chemical pesticides for WWF's meat guides: Methodological and data update

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## About the authors

This study was carried out by [Sytra](#), a research team from the Belgian Université catholique de Louvain (Riera Anton, Antier Clémentine, de Clippele Antoine, Baret Philippe).



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**This document provides all the calculation hypotheses and input values which were used in the calculations of the 75 animal and plant-based products which were assessed in the context of the study.**

## Feed conversion ratios

Table S1. Hypotheses and input values regarding Feed Conversion Ratios (FCRs) of assessed products (continued on following pages).

Country	Product	Certification	Data type	Source FCR	Reference FCR value	Reference FCR Unit	Non-prod. animals?
Austria	Beef	Austria	Generic - country	Ertl et al. (2016)	11,54	kg feed (DM)/kg carcass weight	Not included
Austria	Broiler	Austria	Generic - country	Hou et al. (2016)	2,18	kg feed (DM)/kg carcass weight	Included
Austria	Broiler	Austria Organic	Generic - country	Hou et al. (2016)	2,18	kg feed (DM)/kg carcass weight	Included
Austria	Butter	Austria	Specific	FAO et al. (2014)	20,00	kg feed (DM)/kg edible product	Not included
Austria	Butter	Austria Organic	Specific	FAO et al. (2014)	20,00	kg feed (DM)/kg edible product	Not included
Austria	Cheese	Gouda cheese (cow) - Austria	Specific	FAO et al. (2014)	10,00	kg feed (DM)/kg edible product	Not included
Austria	Cheese	Cream cheese (cow) - Austria	Specific	FAO et al. (2014)	10,00	kg feed (DM)/kg edible product	Not included
Austria	Cheese	Mozzarella (cow) - Austria	Specific	FAO et al. (2014)	10,00	kg feed (DM)/kg edible product	Not included
Austria	Cheese	Gouda cheese (cow) - Austrian Organic	Specific	FAO et al. (2014)	10,00	kg feed (DM)/kg edible product	Not included
Austria	Cheese	Cream cheese (cow) - Austria Organic	Specific	FAO et al. (2014)	10,00	kg feed (DM)/kg edible product	Not included
Austria	Cheese	Mozzarella (cow) - Austrian Organic	Specific	FAO et al. (2014)	10,00	kg feed (DM)/kg edible product	Not included
Austria	Pork	Austria	Generic - country	Winkler et al. (2016)	4,00	kg feed/kg carcass weight	Included

Belgium	Beef	Belgium	Specific	Based on Buron et al. (2018); Hubrecht et al. (2013) ; Rabeux & Elias (2015)	6,20	kg feed (DM)/kg live weight	Not included
Belgium	Beef	Belgium pasture (grass fed)	Specific	Based on Buron et al. (2018); Hubrecht et al. (2013) ; Rabeux & Elias (2015)	7,50	kg feed (DM)/kg live weight	Not included
Belgium	Beef	Belgium Bleu-Blanc-Cœur	Specific	Based on Buron et al. (2018); Hubrecht et al. (2013) ; Rabeux & Elias (2015)	6,50	kg feed (DM)/kg live weight	Not included
Belgium	Beef	Belgium Dairy end-of-life meat	Specific	Cabaraux et al. (2003)	10,80	kg feed (DM)/kg live weight	Not included
Belgium	Beef	Belgium organic	Specific	Based on Buron et al. (2018); Hubrecht et al. (2013) ; Rabeux & Elias (2015)	7,50	kg feed (DM)/kg live weight	Not included
Belgium	Broiler	Belgium	Specific	ITAVI (2015)	1,70	kg feed/kg live weight	Not included
Belgium	Broiler	Belgium Poulet Fermier	Specific	ITAVI (2015)	2,40	kg feed/kg live weight	Not included
Belgium	Broiler	Belgium organic	Specific	ITAVI (2015)	2,60	kg feed/kg live weight	Not included
Belgium	Cheese	Hard cheese (cow) - Belgium	Specific	For Farmers (n.d.)	11,00	kg feed (DM)/kg edible product	Included
Belgium	Eggs	Belgium free range (1)	Specific	Wageningen UR (2013)	2,33	kg feed/kg edible product	Not included
Belgium	Eggs	Belgium barn eggs (2)	Specific	Wageningen UR (2013)	2,20	kg feed/kg edible product	Not included
Belgium	Eggs	Belgium cage (3)	Specific	Wageningen UR (2013)	2,01	kg feed/kg edible product	Not included
Belgium	Eggs	Belgium organic (0)	Specific	Wageningen UR (2013)	2,41	kg feed/kg edible product	Not included
Belgium	Milk	Cow milk - Belgium	Generic - country	For Farmers (n.d.)	1,10	kg feed (DM)/kg edible product	Included
Belgium	Milk	Cow milk - Belgium lait de foin/weidenmelk	Specific	For Farmers (n.d.)	1,50	kg feed (DM)/kg edible product	Included
Belgium	Milk	Cow milk - Belgium organic	Specific	For Farmers (n.d.)	1,70	kg feed (DM)/kg edible product	Included

Belgium	Pork	Belgium	Specific	Nguyen et al. (2010)	2,70	kg feed/kg live weight	Not included
Belgium	Pork	Beter voor iedereen/ Mieux pour tous (Bleu-Blanc-Cœur)	Specific	Nguyen et al. (2010)	2,70	kg feed/kg live weight	Not included
Belgium	Pork	Belgium organic	Specific	Nguyen et al. (2010)	3,30	kg feed/kg live weight	Not included
Estonia	Broiler	Estonia	Generic - country	Personal communication with national expert (2021)	1,52	kg feed/kg live weight	Not included
Estonia	Pork	Estonia	Generic - country	Personal communication with national expert (2021)	2,60	kg feed/kg live weight	Not included
Finland	Beef	Finland	Generic - country	WWF Finland (2016)	12,50	kg feed (DM)/kg edible product	Not included
Finland	Broiler	Finland	Generic - country	WWF Finland (2016)	3,00	kg feed/kg edible product	Included
Finland	Cheese	Hard cheese (cow) - Finland	Specific	WWF Finland (2016)	13,00	kg feed (DM)/kg edible product	Included
Finland	Eggs	Finland	Generic - country	WWF Finland (2016)	2,10	kg feed/kg edible product	Included
Finland	Pork	Finland	Generic - country	Hou et al. (2016)	3,20	kg feed (DM)/kg live weight	Included
France	Broiler	France	Specific	ITAVI (2015)	1,70	kg feed/kg live weight	Not included
France	Broiler	French Label Rouge	Specific	ITAVI (2015)	3,10	kg feed/kg live weight	Not included
France	Broiler	France organic	Specific	ITAVI (2015)	3,00	kg feed/kg live weight	Not included
France	Broiler	France BBC (Bleu Blanc Coeur)	Specific	ITAVI (2015)	2,20	kg feed/kg live weight	Not included
France	Eggs	France	Specific	ITAVI (2015)	2,17	kg feed/kg edible product	Not included
France	Eggs	France cage	Specific	ITAVI (2015)	2,17	kg feed/kg edible product	Not included

France	Eggs	France outdoor	Specific	ITAVI (2015)	2,42	kg feed/kg edible product	Not included
France	Eggs	France organic	Specific	ITAVI (2015)	2,52	kg feed/kg edible product	Not included
France	Eggs	France floor	Specific	ITAVI (2015)	2,34	kg feed/kg edible product	Not included
France	Eggs	France Label Rouge	Specific	ITAVI (2015)	2,56	kg feed/kg edible product	Not included
France	Milk	Cow milk - France	Specific	IDELE et al. (2019)	0,80	kg feed (DM)/kg edible product	Not included
France	Milk	Cow milk - France organic	Specific	IDELE et al. (2019)	0,90	kg feed (DM)/kg edible product	Not included
France	Pork	France	Specific	IFIP (2016)	2,51	kg feed/kg live weight	Not included
France	Pork	France Label Rouge	Specific	IFIP (2016)	2,94	kg feed/kg live weight	Not included
France	Pork	France BBC (Bleu Blanc Coeur)	Generic - system	Nguyen et al. (2010) & pers com with BE experts (2018)	2,70	kg feed/kg live weight	Not included
France	Pork	France organic	Specific	IFIP & ITAB (2016)	3,02	kg feed/kg live weight	Not included
General	Plant-based	Tofu/Tempeh (soy)	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	0,40	kg feed/kg edible product	Included
General	Plant-based	Soybeans	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	1,00	kg feed/kg edible product	Included
General	Plant-based	Seitan	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	1,62	kg feed/kg edible product	Included
General	Plant-based	Härkis (Finnish product, based on fava bean)	Specific	WWF Finland (2016)	1,76	kg feed/kg edible product	Included
General	Plant-based	Legumes conventional	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	1,00	kg feed/kg edible product	Included
General	Plant-based	Tofu/Soy/Tempeh organic	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	0,40	kg feed/kg edible product	Included

General	Plant-based	Seitan organic	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	1,62	kg feed/kg edible product	Included
General	Plant-based	Soybeans organic	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	1,00	kg feed/kg edible product	Included
Sweden	Beef	Sweden	Generic - country	Mogensen et al. (2015)	6,15	kg feed (DM)/kg live weight	Not included
Sweden	Beef	Swedish certified natural pasture	Specific	Mogensen et al. (2015)	8,68	kg feed (DM)/kg live weight	Not included
Sweden	Broiler	Sweden	Generic - country	Moberg et al. (2019)	3,00	kg feed/kg carcass weight	Included
Sweden	Broiler	Swedish climate certified	Generic - country	Moberg et al. (2019)	3,00	kg feed/kg carcass weight	Included
Sweden	Broiler	Swedish Sigill certified	Generic - country	Moberg et al. (2019)	3,00	kg feed/kg carcass weight	Included
Sweden	Broiler	Sweden organic and KRAV	Generic - country	Moberg et al. (2019)	3,00	kg feed/kg carcass weight	Included
Sweden	Cheese	Hard cheese (cow) - Sweden	Specific	Sasu-Boakye et al. (2014)	7,20	kg feed (DM)/kg edible product	Not included
Sweden	Eggs	Sweden	Generic - country	Röös et al. (2014)	2,60	kg feed/kg edible product	Included
Sweden	Eggs	Swedish organic and KRAV	Generic - country	Röös et al. (2014)	2,60	kg feed/kg edible product	Included
Sweden	Pork	Sweden	Specific	Zira et al. (2021)	2,67	kg feed/kg live weight	Included
Sweden	Pork	Swedish climate certified	Generic - country	Moberg et al. (2019)	4,20	kg feed/kg carcass weight	Included
Sweden	Pork	Swedish Sigill certified	Generic - country	Moberg et al. (2019)	4,20	kg feed/kg carcass weight	Included
Sweden	Pork	Sweden organic and KRAV	Specific	Zira et al. (2021)	3,38	kg feed/kg live weight	Included

## Feed compositions

Only total values per feed category are presented here.

- Forage is made up of grazed grass, grass silage, maize silage and other forage;
- Cereals are made up of wheat, barley and maize;
- Protein-rich feed are made up of soybean meal (mainly), rapeseed meal and sunflower meal.

Table S2. Hypotheses and calculation inputs regarding feed compositions for assessed products (continued on following pages).

Country	Product	Certification	Data type	Source FCR	Humid or Dry weight?	Forage total	Cereals Total	Olea-proteaginous	Protein-rich total	Sugar-beet	Others (vit....)
Austria	Beef	Austria	Generic - system	CELAGRI (2020)	Dry weight	85%	7%	0%	3%	5%	0%
Austria	Broiler	Austria	Generic - system	BE Feed company (2018)	Humid weight	0%	65%	7%	20%	0%	8%
Austria	Broiler	Austria Organic	Generic - system	BE Feed company (2018)	Humid weight	0%	65%	4%	26%	0%	5%
Austria	Butter	Austria	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%
Austria	Butter	Austria Organic	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%
Austria	Cheese	Gouda cheese (cow) - Austria	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%
Austria	Cheese	Cream cheese (cow) - Austria	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%
Austria	Cheese	Mozzarella (cow) - Austria	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%
Austria	Cheese	Gouda cheese (cow) - Austrian Organic	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%



Austria	Cheese	Cream cheese (cow) - Austria	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%
Austria	Cheese	Organic Mozzarella (cow) - Austrian	Specific	FAO et al. (2014)	Dry weight	78%	16%	0%	4%	1%	1%
Austria	Pork	Organic Austria	Generic - country	Winkler et al. (2016)	Humid weight	0%	76%	0%	14%	0%	10%
Belgium	Beef	Belgium	Generic - country	CELAGRI (2020)	Dry weight	85%	7%	0%	3%	5%	0%
Belgium	Beef	Belgium pasture (grass fed)	Specific	Faux et al. (2019)	Dry weight	68%	20%	6%	0%	6%	0%
Belgium	Beef	Belgium Bleu-Blanc-Cœur	Generic - country	CELAGRI (2020)	Dry weight	85%	7%	0%	3%	5%	0%
Belgium	Beef	Belgium Dairy end-of-life meat	Generic - country	CELAGRI (2020)	Dry weight	85%	7%	0%	3%	5%	0%
Belgium	Beef	Belgium organic	Specific	Faux et al. (2019)	Dry weight	68%	20%	6%	0%	6%	0%
Belgium	Broiler	Belgium	Specific	BE Feed company (2018)	Humid weight	0%	65%	7%	20%	0%	8%
Belgium	Broiler	Belgium Poulet Fermier	Specific	BE Feed company (2018)	Humid weight	0%	70%	5%	20%	0%	5%
Belgium	Broiler	Belgium organic	Specific	BE Feed company (2018)	Humid weight	0%	65%	4%	26%	0%	5%
Belgium	Cheese	Hard cheese (cow) - Belgium	Specific	Cuvelier & Dufrasne (2015)	Dry weight	88%	5%	0%	2%	5%	0%
Belgium	Eggs	Belgium free range (1)	Generic - system	BE Feed company (2018)	Humid weight	0%	66%	0%	23%	0%	11%
Belgium	Eggs	Belgium barn eggs (2)	Specific	BE Feed company (2018)	Humid weight	0%	68%	0%	20%	0%	12%
Belgium	Eggs	Belgium cage (3)	Generic - country	BE Feed company (2018)	Humid weight	0%	68%	0%	20%	0%	12%
Belgium	Eggs	Belgium organic (0)	Specific	BE Feed company (2018)	Humid weight	0%	66%	0%	23%	0%	11%
Belgium	Milk	Cow milk - Belgium	Generic - system	Boonen et al. (2015)	Dry weight	70%	10%	0%	9%	9%	2%

Belgium	Milk	Cow milk - Belgium lait de foin/ weidenmelk	Generic - system	Boonen et al. (2015)	Dry weight	81%	6%	0%	6%	6%	1%
Belgium	Milk	Cow milk - Belgium organic	Specific	Faux et al. (2019)	Dry weight	83%	14%	3%	0%	0%	0%
Belgium	Pork	Belgium	Specific	BE Feed company (2018)	Humid weight	0%	65%	12%	13%	0%	10%
Belgium	Pork	Beter voor iedereen/ Mieux pour tous (Bleu-Blanc-Cœur)	Specific	BE Feed company (2018)	Humid weight	0%	65%	18%	12%	0%	5%
Belgium	Pork	Belgium organic	Specific	BE Feed company (2018)	Humid weight	0%	67%	15%	14%	0%	4%
Estonia	Broiler	Estonia	Generic - country	Contact with national expert (2021)	Humid weight	0%	73%	0%	19%	0%	8%
Estonia	Pork	Estonia	Generic - country	Contact with national expert (2021)	Humid weight	0%	75%	0%	15%	0%	10%
Finland	Beef	Finland	Generic - country	W'WF Finland (2016)	Dry weight	60%	40%	0%	0%	0%	0%
Finland	Broiler	Finland	Generic - country	W'WF Finland (2016)	Humid weight	0%	60%	0%	35%	0%	5%
Finland	Cheese	Hard cheese (cow) - Finland	Specific	W'WF Finland (2016)	Dry weight	49%	16%	0%	26%	0%	3%
Finland	Eggs	Finland	Generic - country	W'WF Finland (2016)	Humid weight	0%	75%	0%	15%	0%	10%
Finland	Pork	Finland	Generic - country	W'WF Finland (2016)	Humid weight	0%	80%	0%	20%	0%	0%
France	Broiler	France	Specific	Koch & Salou (2020)	Humid weight	0%	68%	3%	26%	0%	3%
France	Broiler	French Label Rouge	Specific	Koch & Salou (2020)	Humid weight	0%	76%	0%	20%	0%	3%
France	Broiler	France organic	Specific	Koch & Salou (2020)	Humid weight	0%	63%	13%	20%	0%	6%
France	Broiler	France BBC (Bleu Blanc Coeur)	Generic - system	BE Feed company (2018)	Humid weight	0%	70%	5%	20%	0%	5%
France	Eggs	France	Specific	Koch & Salou (2020)	Humid weight	0%	63%	2%	23%	0%	11%
France	Eggs	France cage	Specific	Koch & Salou (2020)	Humid weight	0%	63%	2%	23%	0%	11%
France	Eggs	France outdoor	Specific	Koch & Salou (2020)	Humid weight	0%	65%	0%	23%	0%	12%

France	Eggs	France organic	Specific	Koch & Salou (2020)	Humid weight	3%	56%	9%	21%	0%	11%
France	Eggs	France floor	Generic - system	BE Feed company (2018)	Humid weight	0%	66%	0%	23%	0%	11%
France	Eggs	France Label Rouge	Generic - system	BE Feed company (2018)	Humid weight	0%	66%	0%	23%	0%	11%
France	Milk	Cow milk - France	Specific	FAO et al. (2014)	Dry weight	76%	8%	0%	14%	1%	1%
France	Milk	Cow milk - France organic	Specific	FAO et al. (2014)	Dry weight	78%	15%	0%	5%	1%	1%
France	Pork	France	Generic - system	BE Feed company (2018)	Humid weight	0%	65%	12%	13%	0%	10%
France	Pork	France Label Rouge	Generic - system	BE Feed company (2018)	Humid weight	0%	65%	18%	12%	0%	5%
France	Pork	France BBC (Bleu Blanc Coeur)	Generic - system	BE Feed company (2018)	Humid weight	0%	65%	18%	12%	0%	5%
France	Pork	France organic	Generic - system	BE Feed company (2018)	Humid weight	0%	67%	15%	14%	0%	4%
General	Plant-based	Tofu/Tempeh (soy)	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	Humid weight	0%	0%	0%	100%	0%	0%
General	Plant-based	Soybeans	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	Humid weight	0%	0%	0%	100%	0%	0%
General	Plant-based	Seitan	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	Humid weight	0%	100%	0%	0%	0%	0%
General	Plant-based	Härkis (Finnish product, based on fava bean)	Specific	WWF Finland (2016)	Humid weight	0%	0%	100%	0%	0%	0%
General	Plant-based	Legumes conventional	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	Humid weight	0%	0%	100%	0%	0%	0%
General	Plant-based	Tofu/Soy/Tempeh organic	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	Humid weight	0%	0%	0%	100%	0%	0%
General	Plant-based	Seitan organic	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	Humid weight	0%	100%	0%	0%	0%	0%
General	Plant-based	Soybeans organic	Specific	Lindenthal et al. (2018) ; WWF Austria (2018)	Humid weight	0%	0%	0%	100%	0%	0%

Sweden	Beef	Sweden	Generic - country	Mogensen et al. (2015)	Dry weight	50%	46%	0%	2%	2%	0%
Sweden	Beef	Swedish certified natural pasture	Specific	Mogensen et al. (2015)	Dry weight	91%	8%	0%	1%	0%	0%
Sweden	Broiler	Sweden	Specific	Moberg et al. (2019)	Humid weight	0%	77%	2%	17%	0%	4%
Sweden	Broiler	Swedish climate certified	Generic - country	Moberg et al. (2019)	Humid weight	0%	77%	2%	17%	0%	4%
Sweden	Broiler	Swedish Sigill certified	Generic - country	Moberg et al. (2019)	Humid weight	0%	77%	2%	17%	0%	4%
Sweden	Broiler	Sweden organic and KRAV	Generic - country	Moberg et al. (2019)	Humid weight	0%	77%	2%	17%	0%	4%
Sweden	Cheese	Hard cheese (cow) - Sweden	Specific	Sasu-Boakye et al. (2014)	Dry weight	52%	25%	0%	13%	8%	2%
Sweden	Eggs	Sweden	Generic - country	Moberg et al. (2019)	Humid weight	0%	65%	5%	19%	0%	11%
Sweden	Eggs	Swedish organic and KRAV	Generic - country	Moberg et al. (2019)	Humid weight	0%	65%	5%	19%	0%	11%
Sweden	Pork	Sweden	Specific	Zira et al. (2021)	Humid weight	0%	90%	0%	10%	0%	0%
Sweden	Pork	Swedish climate certified	Generic - country	Moberg et al. (2019)	Humid weight	0%	94%	0%	5%	0%	1%
Sweden	Pork	Swedish Sigill certified	Generic - country	Moberg et al. (2019)	Humid weight	0%	94%	0%	5%	0%	1%
Sweden	Pork	Sweden organic and KRAV	Specific	Zira et al. (2021)	Humid weight	0%	87%	6%	7%	0%	0%

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