CODEX ALIMENTARIUS
INTERNATIONAL FOOD STANDARDS

Food and Agriculture Organization of the United Nations
World Health Organization

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MAXIMUM RESIDUE LIMITS (MRLs) AND RISK MANAGEMENT RECOMMENDATIONS (RMRs) FOR RESIDUES OF VETERINARY DRUGS IN FOODS

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LIST OF ABBREVIATIONS

5,7-DCL	5,7-dichloroquinolin-8-ol
5,7-DCLG	5,7-dichloroquinolin-8-ol glucuronide
5-CL	5-chloroquinolin-8-ol
5-CLG	5-chloroquinolin-8-ol glucuronide
ADI	acceptable daily intake
ARfD	acute reference dose
BMD	benchmark dose
BMDL	confidence limit for BMD
bw	body weight
CAC	Codex Alimentarius Commission
CCPR	Codex Committee on Pesticide Residues
CCRVDF	Codex Committee on Residues of Veterinary Drugs in Foods
DIA	Dichloroisoeverninic acid
DNC	Dinitrocarbanilide
EDI	estimated daily intake
FAO	Food and Agriculture Organization
GEADE	global estimated acute dietary exposure
GECDE	global estimated chronic dietary exposure
H_2B_{1a}	22,23-dihydroavermectin B1a
HDP	2-hydroxy-4,6-dimethylpyrimidine
IARC	International Agency for Research on Cancer
JECFA	Joint FAO/WHO Expert Committee on Food Additives
JMPR	Joint FAO/WHO Expert Meeting on Pesticide Residues
LOAEL	lowest-observed-adverse-effect level
LOQ	limit of quantification
mADI	microbiological acceptable daily intake
MIC	minimum inhibitory concentration
MR	marker residue
MR:TR	ratio of marker residues to total residues
MRL	maximum residue limit
NOAEL	no-observed-adverse-effect level
RMR	risk management recommendation
tADI	toxicological acceptable daily intake
TMDI	theoretical maximum daily intake
TRS	Technical Report Series
WHO	World Health Organization

LIST OF COMPOUNDS FOR WHICH CODEX HAS ESTABLISHED MAXIMUM RESIDUE LIMITS OR RISK MANAGEMENT RECOMMENDATIONS FOR RESIDUES OF VETERINARY DRUGS IN FOODS

Maximum residue limits

Abamectin
Albendazole
Amoxicillin
Ampicillin
Avilamycin
Azaperone
Benzylpenicillin/Procaine benzylpenicillin
Carazolol
Ceftiofur
Chlortetracycline/Oxytetracycline/Tetracycline
Clenbuterol
Clopidol
Closantel
Colistin
Cyfluthrin
Cyhalothrin
Cypermethrin and alpha-cypermethrin
Danofloxacin
Deltamethrin
Derquantel
Dexamethasone
Diclazuril
Dicyclanil
Diflubenzuron
Dihydrostreptomycin/Streptomycin
Diminazene
Doramectin
Emamectin benzoate
Eprinomectin
Erythromycin
Estradiol-17beta
Febantel/Fenbendazole/Oxfendazole
Fluazuron
Flubendazole
Flumequine
Flumethrin
Gentamicin
Halquinol
Imidacloprid
Imidocarb
Isometamidium
Ivermectin
Lasalocid sodium
Levamisole
Lincomycin
Lufenuron
Melengestrol acetate
Monensin
Monepantel
Moxidectin
Narasin
Neomycin
Nicarbazin
Phoxim
Pirlimycin
Porcine somatotropin
Progesterone
Ractopamine
Sarafloxacin
Spectinomycin
Spiramycin
Sulfadimidine
Teflubenzuron
Testosterone
Thiabendazole
Tilmicosin
Trenbolone acetate
Trichlorfon (Metrifonate)
Triclabendazole
Tylosin
Zeranol
Zilpaterol Hydrochloride

Extrapolated maximum residue limits

Ruminants
Amoxicillin
Benzylpenicillin
Cyhalothrin
Cypermethrin
Deltamethrin
Levamisole
Ivermectin
Moxidectin
Spectinomycin
Tetracyclines
Tilmicosin

PART I

MAXIMUM RESIDUE LIMITS FOR RESIDUES OF VETERINARY DRUGS IN FOODS

ABAMECTIN (anthelmintic agent)				
JECFA evaluation		45 (1995); 47 (1996)		
Acceptable daily intake		0–2 µg/kg bw (1997) established for the sum of abamectin and (Z)-8,9 isomer by JMPR (1997)		
Residue definition		Avermectin B1a		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Liver	100		26 (2003)
Cattle	Kidney	50		26 (2003)
Cattle	Fat	100		26 (2003)

ALBENDAZOLE (anthelmintic agent)				
JECFA evaluation		34 (1989)		
Acceptable daily intake		0–50 µg/kg bw (JECFA34)		
Residue definition		Except for milk, 2-aminosulfone metabolite; Milk, not yet identified.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Not specified	Muscle	100		20 (1993)
Not specified	Liver	5 000		20 (1993)
Not specified	Kidney	5 000		20 (1993)
Not specified	Fat	100		20 (1993)
Not specified	Milk (µg/l)	100		20 (1993)

AMOXICILLIN (antimicrobial agent)				
JECFA evaluation		75 (2011); 85 (2017)		
Microbiological acceptable daily intake		0–0.002 mg/kg bw based on the effects of amoxicillin on the intestinal microbiota.		
Acute reference dose		0.005 mg/kg bw based on microbiological effects on the intestinal microbiota.		
Estimated chronic dietary exposure		0.14 µg/kg bw per day (for the general population), which represents 7% of the upper bound of the mADI.		
Estimated acute dietary exposure		1.4 µg/kg bw (for the general population), which represents 28% of the microbiological ARfD. 1.6 µg/kg bw (for children), which represents 31% of the microbiological ARfD.		
Residue definition		Amoxicillin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	50		35 (2012)
Cattle	Liver	50		35 (2012)
Cattle	Kidney	50		35 (2012)
Cattle	Fat	50		35 (2012)
Cattle	Milk	4		35 (2012)
Sheep	Muscle	50		35 (2012)
Sheep	Liver	50		35 (2012)
Sheep	Kidney	50		35 (2012)
Sheep	Fat	50		35 (2012)
Sheep	Milk	4		35 (2012)
Pigs	Muscle	50		35 (2012)
Pigs	Liver	50		35 (2012)
Pigs	Kidney	50		35 (2012)
Pigs	Fat/Skin	50		35 (2012)
Finfish	Fillet	50	The term “finfish” includes all fish species. Muscle plus skin in a natural proportion.	41 (2018)
	Muscle	50	The term “finfish” includes all fish species.	41 (2018)

AMPICILLIN (antimicrobial agent)				
JECFA evaluation		85 (2017)		
Microbiological acceptable daily intake		0–0.003 mg/kg bw based on a NOAEL equivalent to 0.025 mg/kg bw per day for an increase in population(s) of ampicillin-resistant bacteria in the gastrointestinal tract in humans and using a safety factor of 10 (for the variability in the composition of the intestinal microbiota within and between individuals).		
Acute reference dose		0.012 mg/kg bw based on the microbiological end-point		
Estimated chronic dietary exposure		0.29 µg/kg bw per day (for the general population), which represents 10% of the upper bound of the ADI.		
Estimated acute dietary exposure		1.9 µg/kg bw per day (for the general population), which represents 16% of the ARfD. 1.7 µg/kg bw per day (for children), which represents 14% of the ARfD		
Residue definition		Ampicillin		
Note		JECFA85 recommended an MRL of 50 µg/kg for ampicillin in finfish muscle and finfish muscle plus skin in natural proportion, the same as that recommended for amoxicillin, because the modes of action, the physicochemical properties and the toxicological and pharmacokinetic profiles of amoxicillin and ampicillin are very similar.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Finfish	Fillet	50	The term “finfish” includes all fish species. Muscle plus skin in a natural proportion.	41 (2018)
	Muscle	50	The term “finfish” includes all fish species.	41 (2018)

AVILAMYCIN (antimicrobial agent)				
JECFA evaluation		70 (2008)		
Acceptable daily intake		0–2 mg/kg bw on the basis of a NOAEL of 150 mg avilamycin activity/kg bw per day and a safety factor of 100 and rounding to one significant figure. (JECFA70)		
Residue definition		Dichloroisoeverninic acid (DIA)		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Pigs	Muscle	200		32 (2009)
Pigs	Liver	300		32 (2009)
Pigs	Kidney	200		32 (2009)
Pigs	Fat/Skin	200		32 (2009)
Chicken	Muscle	200		32 (2009)
Chicken	Liver	300		32 (2009)
Chicken	Kidney	200		32 (2009)
Chicken	Fat/Skin	200		32 (2009)
Turkey	Muscle	200		32 (2009)
Turkey	Liver	300		32 (2009)
Turkey	Kidney	200		32 (2009)
Turkey	Fat/Skin	200		32 (2009)
Rabbits	Muscle	200		32 (2009)
Rabbits	Liver	300		32 (2009)
Rabbits	Kidney	200		32 (2009)
Rabbits	Fat/Skin	200		32 (2009)

AZAPERONE (tranquillizing agent)				
JECFA evaluation		38 (1991); 43 (1994); 50 (1998); 52 (1999)		
Acceptable daily intake		0–6 µg/kg bw (JECFA50)		
Residue definition		Sum of azaperone and azaperol		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Pig	Muscle	60		23 (1999)
Pig	Liver	100		23 (1999)
Pig	Kidney	100		23 (1999)
Pig	Fat	60		23 (1999)

BENZYLPENICILLIN/PROCAINE BENZYLPENICILLIN (antimicrobial agent)				
JECFA evaluation		36 (1990); 50 (1998)		
Acceptable daily intake		30 µg-penicillin/person/day (JECFA50). Residues of benzylpenicillin and procaine benzylpenicillin should be kept below this level.		
Residue definition		Benzylpenicillin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	50		23 (1999)
Cattle	Liver	50		23 (1999)
Cattle	Kidney	50		23 (1999)
Cattle	Milk (µg/l)	4		23 (1999)
Chicken	Muscle	50	Applies to procaine benzylpenicillin only.	23 (1999)
Chicken	Liver	50	Applies to procaine benzylpenicillin only.	23 (1999)
Chicken	Kidney	50	Applies to procaine benzylpenicillin only.	23 (1999)
Pig	Muscle	50		23 (1999)
Pig	Liver	50		23 (1999)
Pig	Kidney	50		23 (1999)

CARAZOLOL (beta-adreniceptor-blocking agent)				
JECFA evaluation		38 (1991); 43 (1994); 52 (1999)		
Acceptable daily intake		0–0.1 µg/kg bw (JECFA43). ADI based on the acute pharmacological effects of carazolol		
Residue definition		Carazolol		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Pig	Muscle	5	The concentration at the injection site two hours after treatment may result in an intake that exceeds the ARfD therefore, an appropriate withdrawal period should be applied.	26 (2003)
Pig	Liver	25		26 (2003)
Pig	Kidney	25		26 (2003)
Pig	Fat/Skin	5	The concentration at the injection site two hours after treatment may result in an intake exceeding the ARfD; therefore, an appropriate withdrawal period should be applied.	26 (2003)

CEFTIOFUR (antimicrobial agent)				
JECFA evaluation		45 (1995); 48 (1997)		
Acceptable daily intake		0–50 µg/kg bw (JECFA45)		
Residue definition		Desfuroylceftiofur		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	1 000		23 (1999)
Cattle	Liver	2 000		23 (1999)
Cattle	Kidney	6 000		23 (1999)
Cattle	Fat	2 000		23 (1999)
Cattle	Milk (µg/l)	100		23 (1999)
Pig	Muscle	1 000		23 (1999)
Pig	Liver	2 000		23 (1999)
Pig	Kidney	6 000		23 (1999)
Pig	Fat	2 000		23 (1999)

CHLORTETRACYCLINE/OXYTETRACYCLINE/TETRACYCLINE (antimicrobial agent)				
JECFA evaluation		45 (1995); 47 (1996); 50 (1998); 58 (2002)		
Acceptable daily intake		Group ADI for chlortetracycline, oxytetracycline and tetracycline: 0–30 µg/kg bw (JECFA50). Group ADI for chlortetracycline, oxytetracycline and tetracycline.		
Residue definition		Parent drugs, singly or in combination.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	200		26 (2003)
Cattle	Liver	600		26 (2003)
Cattle	Kidney	1 200		26 (2003)
Cattle	Milk (µg/l)	100		26 (2003)
Fish	Muscle	200	Applies only to oxytetracycline.	26 (2003)
Giant prawn (*Paeneus monodon*)	Muscle	200	Applies only to oxytetracycline.	26 (2003)
Pig	Muscle	200		26 (2003)
Pig	Liver	600		26 (2003)
Pig	Kidney	1 200		26 (2003)
Poultry	Muscle	200		26 (2003)
Poultry	Liver	600		26 (2003)
Poultry	Kidney	1 200		26 (2003)
Poultry	Eggs	400		26 (2003)
Sheep	Muscle	200		26 (2003)
Sheep	Liver	600		26 (2003)
Sheep	Kidney	1 200		26 (2003)
Sheep	Milk (µg/l)	100		26 (2003)

CLENBUTEROL (adrenoceptor agonist)				
JECFA evaluation		47 (1996)		
Acceptable daily intake		0–0.004 µg/kg bw (JECFA47)		
Residue definition		Clenbuterol		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	0.2	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Cattle	Liver	0.6	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Cattle	Kidney	0.6	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Cattle	Fat	0.2	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Cattle	Milk (µg/l)	0.05	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Horse	Muscle	0.2	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Horse	Liver	0.6	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Horse	Kidney	0.6	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)
Horse	Fat	0.2	Due to the potential abuse of this drug, the MRLs are recommended only when associated with a nationally approved therapeutic use, such as tocolysis or as an adjunct therapy in respiratory diseases.	26 (2003)

CLOPIDOL (coccidiostat)				
JECFA evaluation		98 (2024)		
Acceptable daily intake		JECFA98 established an ADI for clopidol of 0–0.04 mg/kg bw based on a LOAEL of 40 mg/kg bw per day for decreased maternal body weight gain and foetal body weight in a developmental toxicity study in rats. An uncertainty factor of 1000 was applied, comprising 100 for interspecies and intraspecies differences, additional factors of 2 to account for using a marginal LOAEL, and 5 for database uncertainty.		
Acute reference dose		JECFA98 concluded that, in view of the low acute oral toxicity of clopidol and the absence of developmental toxicity or any other toxicological effects likely to be elicited by a single dose, it was unnecessary to establish an ARfD for clopidol.		
Estimated chronic dietary exposure		For clopidol included at 250 mg/kg in feed at 24-hour withdrawal and the most conservative ratio of marker residues to total residues (MR:TR) considered of 0.5, the global estimates of chronic dietary exposure (GECDEs) are: • for adults and the elderly, 32.9 µg/kg bw per day; • for children and adolescents, 33.5 µg/kg bw per day; and • for infants and toddlers, 28.6 µg/kg bw per day (representing 82%, 84%, and 71%, respectively, of the upper bound of the ADI of 40 µg/kg bw).		
Residue definition		The marker residue for clopidol in chicken liver, kidney, muscle, and skin/fat is clopidol.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Chicken	Muscle	8 800		47 (2024)
Chicken	Liver	10 400		47 (2024)
Chicken	Muscle	4 100		47 (2024)
Chicken	Skin/Fat	2 600		47 (2024)

CLOSANTEL (anthelmintic agent)				
JECFA evaluation		36 (1990); 40 (1992)		
Acceptable daily intake		0–30 µg/kg bw (JECFA40)		
Residue definition		Closantel		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	1 000		20 (1993)
Cattle	Liver	1 000		20 (1993)
Cattle	Kidney	3 000		20 (1993)
Cattle	Fat	3 000		20 (1993)
Sheep	Muscle	1 500		20 (1993)
Sheep	Liver	1 500		20 (1993)
Sheep	Kidney	5 000		20 (1993)
Sheep	Fat	2 000		20 (1993)

COLISTIN (antimicrobial agent)				
JECFA evaluation		66 (2006)		
Acceptable daily intake		0–7 µg/kg bw (JECFA66)		
Residue definition		The sum of colistin A and colistin B		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	150		31 (2008)
Cattle	Liver	150		31 (2008)
Cattle	Kidney	200		31 (2008)
Cattle	Fat	150		31 (2008)
Cattle	Milk	50		31 (2008)
Sheep	Muscle	150		31 (2008)
Sheep	Liver	150		31 (2008)
Sheep	Kidney	200		31 (2008)
Sheep	Fat	150		31 (2008)
Sheep	Milk	50		31 (2008)
Goat	Muscle	150		31 (2008)
Goat	Liver	150		31 (2008)
Goat	Kidney	200		31 (2008)
Goat	Fat	150		31 (2008)
Pig	Muscle	150		31 (2008)
Pig	Liver	150		31 (2008)
Pig	Kidney	200		31 (2008)
Pig	Fat	150	The MRL includes skin + fat	31 (2008)
Chicken	Muscle	150		31 (2008)
Chicken	Liver	150		31 (2008)
Chicken	Kidney	200		31 (2008)
Chicken	Fat	150	The MRL includes skin + fat	31 (2008)
Chicken	Eggs	300		31 (2008)
Turkey	Muscle	150		31 (2008)
Turkey	Liver	150		31 (2008)
Turkey	Kidney	200		31 (2008)
Turkey	Fat	150	The MRL includes skin + fat	31 (2008)
Rabbit	Muscle	150		31 (2008)
Rabbit	Liver	150		31 (2008)
Rabbit	Kidney	200		31 (2008)
Rabbit	Fat	150		31 (2008)

CYFLUTHRIN (insecticide)				
JECFA evaluation		48 (1997)		
Acceptable daily intake		0–20 µg/kg bw (JECFA48)		
Residue definition		Cyfluthrin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	20		26 (2003)
Cattle	Liver	20		26 (2003)
Cattle	Kidney	20		26 (2003)
Cattle	Fat	200		26 (2003)
Cattle	Milk (µg/l)	40		26 (2003)

CYHALOTHRIN (insecticide)				
JECFA evaluation		54 (2000); 58 (2002); 62 (2004)		
Acceptable daily intake		0–5 µg/kg bw (JECFA62)		
Residue definition		Cyhalothrin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	20		28 (2005)
Cattle	Liver	20		28 (2005)
Cattle	Kidney	20		28 (2005)
Cattle	Fat	400		28 (2005)
Cattle	Milk	30		28 (2005)
Pig	Muscle	20		28 (2005)
Pig	Liver	20		28 (2005)
Pig	Kidney	20		28 (2005)
Pig	Fat	400		28 (2005)
Sheep	Muscle	20		28 (2005)
Sheep	Liver	50		28 (2005)
Sheep	Kidney	20		28 (2005)
Sheep	Fat	400		28 (2005)

CYPERMETHRIN AND ALPHA-CYPERMETHRIN (insecticide)				
JECFA evaluation		62 (2004)		
Acceptable daily intake		JECFA62 established a common ADI of 0–20 µg/kg bw for both cypermethrin and alpha-cypermethrin.		
Residue definition		Total of cypermethrin residues (resulting from the use of cypermethrin or alpha-cypermethrin as veterinary drugs).		
Species	**Tissue**	**MRL (µg/kg)**	**Note**	**CAC**
Cattle	Muscle	50		29 (2006)
Cattle	Liver	50		29 (2006)
Cattle	Kidney	50		29 (2006)
Cattle	Fat	1 000		29 (2006)
Cattle	Milk	100		29 (2006)
Sheep	Muscle	50		29 (2006)
Sheep	Liver	50		29 (2006)
Sheep	Kidney	50		29 (2006)
Sheep	Fat	1 000		29 (2006)

DANOFLOXACIN (antimicrobial agent)				
JECFA evaluation		48 (1997)		
Acceptable daily intake		0–20 µg/kg bw (JECFA48)		
Residue definition		Danofloxacin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	200		24 (2001)
Cattle	Liver	400		24 (2001)
Cattle	Kidney	400		24 (2001)
Cattle	Fat	100		24 (2001)
Chicken	Muscle	200		24 (2001)
Chicken	Liver	400		24 (2001)
Chicken	Kidney	400		24 (2001)
Chicken	Fat	100	Fat/skin in normal proportion.	24 (2001)
Pig	Muscle	100		24 (2001)
Pig	Liver	50		24 (2001)
Pig	Kidney	200		24 (2001)
Pig	Fat	100		24 (2001)

DELTAMETHRIN (insecticide)				
JECFA evaluation		52 (1999); 60 (2003)		
Acceptable daily intake		0–10 µg/kg bw (1982). Established by JMPR (1982).		
Residue definition		Deltamethrin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	30		26 (2003)
Cattle	Liver	50		26 (2003)
Cattle	Kidney	50		26 (2003)
Cattle	Fat	500		26 (2003)
Cattle	Milk	30		26 (2003)
Chicken	Muscle	30		26 (2003)
Chicken	Liver	50		26 (2003)
Chicken	Kidney	50		26 (2003)
Chicken	Fat	500		26 (2003)
Chicken	Eggs	30		26 (2003)
Salmon	Muscle	30		26 (2003)
Sheep	Muscle	30		26 (2003)
Sheep	Liver	50		26 (2003)
Sheep	Kidney	50		26 (2003)
Sheep	Fat	500		26 (2003)

DERQUANTEL (anthelmintic agent)				
JECFA evaluation		75 (2011); 78 (2013)		
Acceptable daily intake		0–0.3 µg/kg bw based on a LOAEL of 0.1 mg/kg bw per day for acute clinical observations in dogs, consistent with antagonistic activity on the nicotinic acetylcholine receptors. A safety factor of 300 was applied to the LOAEL. (JECFA75)		
Estimated dietary exposure		There was insufficient data to calculate an EDI, and the TMDI approach was used. Using the model diet and the MT:TR approach, these MRLs result in an estimated dietary exposure of 6.8 µg/person, representing approximately 38% of the upper bound of the ADI. (JECFA78)		
Residue definition		Derquantel		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Sheep	Muscle	0.3		38 (2015)
Sheep	Liver	0.8		38 (2015)
Sheep	Kidney	0.4		38 (2015)
Sheep	Fat	7.0		38 (2015)

DEXAMETHASONE (glucocorticosteroid)				
JECFA evaluation		70 (2008)		
Acceptable daily intake		0–0.015 µg/kg bw (JECFA42)		
Residue definition		Dexamethasone		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	1.0		32 (2009)
Cattle	Liver	2.0		32 (2009)
Cattle	Kidney	1.0		32 (2009)
Cattle	Milk (µg/l)	0.3		32 (2009)
Pig	Muscle	1.0		32 (2009)
Pig	Liver	2.0		32 (2009)
Pig	Kidney	1.0		32 (2009)
Horses	Muscle	1.0		32 (2009)
Horses	Liver	2.0		32 (2009)
Horses	Kidney	1.0		32 (2009)

DICLAZURIL (antiprotozoal agent)				
JECFA evaluation		45 (1995); 50 (1998)		
Acceptable daily intake		0–30 µg/kg bw (JECFA50)		
Residue definition		Diclazuril		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Poultry	Muscle	500		23 (1999)
Poultry	Liver	3 000		23 (1999)
Poultry	Kidney	2 000		23 (1999)
Poultry	Fat/Skin	1 000		23 (1999)
Rabbit	Muscle	500		23 (1999)
Rabbit	Liver	3 000		23 (1999)
Rabbit	Kidney	2 000		23 (1999)
Rabbit	Fat	1 000		23 (1999)
Sheep	Muscle	500		23 (1999)
Sheep	Liver	3 000		23 (1999)
Sheep	Kidney	2 000		23 (1999)
Sheep	Fat	1 000		23 (1999)

DICYCLANIL (insecticide)				
JECFA evaluation		54 (2000); 60 (2003)		
Acceptable daily intake		0–7 µg/kg bw (JECFA54)		
Residue definition		Dicyclanil		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Sheep	Muscle	150		28 (2005)
Sheep	Liver	125		28 (2005)
Sheep	Kidney	125		28 (2005)
Sheep	Fat	200		28 (2005)

DIFLUBENZURON (insecticide)				
JECFA evaluation		88 (2019)		
Acceptable daily intake		JECFA established an ADI of 0–0.02 mg/kg bw – based on a NOAEL of 2 mg/kg bw per day for increased methaemoglobin and sulfhaemoglobin levels in a 2-year study of toxicity and carcinogenicity in rats; and increased methaemoglobin and sulfhaemoglobin levels, platelet counts and hepatic pigmentation in a 1-year study of toxicity in dogs – applying a safety factor of 100 (10 for interspecies variability and 10 for intraspecies variability).		
Acute reference dose		JECFA reiterated the conclusion of the 81st meeting (1) that it was not necessary to establish an ARfD in view of the low acute oral toxicity and the absence of developmental toxicity, and any other toxicological effects likely to be elicited by a single dose.		
Estimated chronic dietary exposure		The GECDE for the general population is 0.84 µg/kg bw per day, representing 4% of the upper bound of the ADI. The GECDE for children is 2.85 µg/kg bw per day, representing 14% of the upper bound of the ADI.		
Estimated acute dietary exposure		The acute dietary exposure was not estimated because JECFA concluded that it was not necessary to establish an ARfD.		
Residue definition		JECFA reconfirmed Diflubenzuron as the marker residue (MR), and the ratio of the MR to the total radioactive residue of 0.9 was established at JECFA81.		
Maximum residue limits		JECFA recommended an MRL in salmon of 10 µg/kg in muscle plus skin in natural proportions.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Salmon	Muscle plus skin in natural proportions	10		44 (2021)

DIHYDROSTREPTOMYCIN / STREPTOMYCIN (antimicrobial agent)				
JECFA evaluation		43 (1994); 48 (1997); 52 (1999); 58 (2002)		
Acceptable daily intake		0–50 µg/kg bw (JECFA48). Group ADI for combined residues of dihydrostreptomycin and streptomycin.		
Residue definition		Sum of dihydrostreptomycin and streptomycin.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	600		24 (2001)
Cattle	Liver	600		24 (2001)
Cattle	Kidney	1 000		24 (2001)
Cattle	Fat	600		24 (2001)
Cattle	Milk	200		26 (2003)
Chicken	Muscle	600		24 (2001)
Chicken	Liver	600		24 (2001)
Chicken	Kidney	1 000		24 (2001)
Chicken	Fat	600		24 (2001)
Pig	Muscle	600		24 (2001)
Pig	Liver	600		24 (2001)
Pig	Kidney	1 000		24 (2001)
Pig	Fat	600		24 (2001)
Sheep	Muscle	600		24 (2001)
Sheep	Liver	600		24 (2001)
Sheep	Kidney	1 000		24 (2001)
Sheep	Fat	600		24 (2001)
Sheep	Milk	200		26 (2003)

DIMINAZENE (trypanocide)				
JECFA evaluation		34 (1989); 42 (1994)		
Acceptable daily intake		0-100 µg/kg bw (JECFA42)		
Residue definition		Diminazene		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	500		22 (1997)
Cattle	Liver	12 000		22 (1997)
Cattle	Kidney	6 000		22 (1997)
Cattle	Milk (µg/l)	150	LOQ of the analytical method.	22 (1997)

DORAMECTIN (anthelmintic agent)				
JECFA evaluation		45 (1995); 52 (1999); 58 (2002); 62 (2004)		
Acceptable daily intake		0–1 µg/kg bw (JECFA58)		
Residue definition		Doramectin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	10	High concentration of residues at the injection site over a 35-day period after subcutaneous or intramuscular administration of the drug at the recommended dose.	22 (1997)
Cattle	Liver	100		22 (1997)
Cattle	Kidney	30		22 (1997)
Cattle	Fat	150	High concentration of residues at the injection site over a 35-day period after subcutaneous or intramuscular administration of the drug at the recommended dose.	22 (1997)
Cattle	Milk	15	Depending on the route and/or time of administration, the use of doramectin in dairy cows may result in extended withdrawal periods in milk. This may be addressed in national/regional regulatory programmes.	29 (2006)
Pig	Muscle	5		24 (2001)
Pig	Liver	100		24 (2001)
Pig	Kidney	30		24 (2001)
Pig	Fat	150		24 (2001)

EMAMECTIN BENZOATE (antiparasitic agent)				
JECFA evaluation		78 (2013)		
Acceptable daily intake		ADI of 0–0.5 µg/kg bw established by JMPR (2011), based on an overall NOAEL of 0.25 mg/kg bw per day for neurotoxicity from 14- and 53-week studies in dogs, supported by an overall NOAEL of 0.25 mg/kg bw per day from 1- and 2-year studies in rats. An uncertainty factor of 500 was applied to the NOAEL, which includes an additional uncertainty factor of 5 to account for the steep dose–response curve and irreversible histopathological effects in neural tissues at the LOAEL in dogs, as used by JMPR and confirmed by JECFA78.		
Estimated dietary exposure		11 µg/person per day, which represents approximately 37% of the upper bound of the ADI (JECFA78).		
Residue definition		Emamectin B1a		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Salmon	Muscle	100		38 (2015)
Salmon	Fillet	100	Muscle plus skin in a natural proportion.	38 (2015)
Trout	Muscle	100		38 (2015)
Trout	Fillet	100	Muscle plus skin in a natural proportion.	38 (2015)

EPRINOMECTIN (anthelmintic agent)				
JECFA evaluation		50 (1998)		
Acceptable daily intake		0–10 µg/kg bw (JECFA50)		
Residue definition		Eprinomectin B1a		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	100		26 (2003)
Cattle	Liver	2 000		26 (2003)
Cattle	Kidney	300		26 (2003)
Cattle	Fat	250		26 (2003)
Cattle	Milk (µg/l)	20		26 (2003)

ERYTHROMYCIN (antimicrobial agent)				
JECFA evaluation		66 (2006)		
Acceptable daily intake		0–0.7 µg/kg bw (JECFA66)		
Residue definition		Erythromycin A		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Chicken	Muscle	100		31 (2008)
Chicken	Liver	100		31 (2008)
Chicken	Kidney	100		31 (2008)
Chicken	Fat	100	The MRL includes skin + fat	31 (2008)
Chicken	Eggs	50		31 (2008)
Turkey	Muscle	100		31 (2008)
Turkey	Liver	100		31 (2008)
Turkey	Kidney	100		31 (2008)
Turkey	Fat	100	The MRL includes skin + fat	31 (2008)

ESTRADIOL-17BETA (production aid)				
JECFA evaluation		25 (1981); 32 (1987); 52 (1999)		
Acceptable daily intake		Unnecessary (JECFA32); 0–0.05 µg/kg bw (JECFA52)		
Residue definition		Estradiol-17beta		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)
Cattle	Liver	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)
Cattle	Kidney	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)
Cattle	Fat	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)

FEBANTEL/FENBENDAZOLE/OXFENDAZOLE (anthelmintic agent)				
JECFA evaluation		38 (1991); 45 (1995); 50 (1998)		
Acceptable daily intake		Group ADI of 0–7 µg/kg bw (JECFA50)		
Residue definition		The sum of fenbendazole, oxfendazole and oxfendazole sulphone, expressed as oxfendazole sulphone equivalents.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	100		23 (1999)
Cattle	Liver	500		23 (1999)
Cattle	Kidney	100		23 (1999)
Cattle	Fat	100		23 (1999)
Cattle	Milk (µg/l)	100		23 (1999)
Goat	Muscle	100		23 (1999)
Goat	Liver	500		23 (1999)
Goat	Kidney	100		23 (1999)
Goat	Fat	100		23 (1999)
Horse	Muscle	100		23 (1999)
Horse	Liver	500		23 (1999)
Horse	Kidney	100		23 (1999)
Horse	Fat	100		23 (1999)
Pig	Muscle	100		23 (1999)
Pig	Liver	500		23 (1999)
Pig	Kidney	100		23 (1999)
Pig	Fat	100		23 (1999)
Sheep	Muscle	100		23 (1999)
Sheep	Liver	500		23 (1999)
Sheep	Kidney	100		23 (1999)
Sheep	Fat	100		23 (1999)
Sheep	Milk (µg/l)	100		23 (1999)

FLUAZURON (insecticide)				
JECFA evaluation		48 (1997)		
Acceptable daily intake		0–40 µg/kg bw (JECFA48)		
Residue definition		Fluazuron		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	200		23 (1999)
Cattle	Liver	500		23 (1999)
Cattle	Kidney	500		23 (1999)
Cattle	Fat	7 000		23 (1999)

FLUBENDAZOLE (anthelmintic agent)				
JECFA evaluation		40 (1992)		
Acceptable daily intake		0–12 µg/kg bw (JECFA40)		
Residue definition		Flubendazole		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Pig	Muscle	10		21 (1995)
Pig	Liver	10		21 (1995)
Poultry	Muscle	200		21 (1995)
Poultry	Liver	500		21 (1995)
Poultry	Eggs	400		21 (1995)

FLUMEQUINE (antimicrobial agent)				
JECFA evaluation		42 (1994); 48 (1997); 54 (2000); 60 (2002); 62 (2004); 66 (2006)		
Acceptable daily intake		0–30 µg/kg bw (JECFA62)		
Residue definition		Flumequine		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	500		28 (2005)
Cattle	Liver	500		28 (2005)
Cattle	Kidney	3 000		28 (2005)
Cattle	Fat	1 000		28 (2005)
Chicken	Muscle	500		28 (2005)
Chicken	Liver	500		28 (2005)
Chicken	Kidney	3 000		28 (2005)
Chicken	Fat	1 000		28 (2005)
Pig	Muscle	500		28 (2005)
Pig	Liver	500		28 (2005)
Pig	Kidney	3 000		28 (2005)
Pig	Fat	1 000		28 (2005)
Sheep	Muscle	500		28 (2005)
Sheep	Liver	500		28 (2005)
Sheep	Kidney	3 000		28 (2005)
Sheep	Fat	1 000		28 (2005)
Trout	Muscle	500	Muscle including a normal proportion of skin.	28 (2005)

FLUMETHRIN (insecticide)				
JECFA evaluation	85 (2017)			
Acceptable daily intake	0–0.004 mg/kg bw based on the NOAEL of 0.37 mg/kg bw per day for skin lesions in parental animals and reduced survival and body weight gain in pups in a two-generation toxicity study in rats and using a safety factor of 100 (10 for interspecies variability and 10 for intraspecies variability).			
Acute reference dose	0.005 mg/kg bw based on the NOAEL of 0.5 mg/kg bw for salivation in dams in a developmental toxicity study in rats and using a safety factor of 100 (10 for interspecies variability and 10 for intraspecies variability).			
Estimated chronic dietary exposure	0.008 µg/kg bw per day (for the general population), which represents 0.2% of the upper bound of the ADI. 0.006 µg/kg bw per day (for children), which represents 0.2% of the upper bound of the ADI. Note: As Flumethrin is also used as a pesticide, the overall dietary exposure was estimated. The assumptions and detailed results will be displayed in the JECFA85 report. The results below are only for use as a veterinary drug.			
Estimated acute dietary exposure	0.1 µg/kg bw per day (for the general population), which represents 2.2% of the ARfD. 0.1 µg/kg bw per day (for children), which represents 2.2% of the ARfD.			
Residue definition	Flumethrin (trans-Z1 and trans-Z2 diastereomers at a ratio of approximately 60:40).			
Species	**Tissue**	**MRL (µg/kg)**	**Note**	**CAC**
	Honey	Unnecessary	Residues resulting from the use of this substance as an insecticide in accordance with good practice for veterinary drugs are unlikely to pose a hazard to human health.	CAC44 (2021)

GENTAMICIN (antimicrobial agent)				
JECFA evaluation		43 (1994); 48 (1997); 50 (1998)		
Acceptable daily intake		0–20 µg/kg bw (JECFA50)		
Residue definition		Gentamicin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	100		24 (2001)
Cattle	Liver	2 000		24 (2001)
Cattle	Kidney	5 000		24 (2001)
Cattle	Fat	100		24 (2001)
Cattle	Milk (µg/l)	200		24 (2001)
Pig	Muscle	100		24 (2001)
Pig	Liver	2 000		24 (2001)
Pig	Kidney	5 000		24 (2001)
Pig	Fat	100		24 (2001)

HALQUINOL (broad-spectrum antimicrobial)				
JECFA evaluation		88 (2019)		
Acceptable daily intake		JECFA established an ADI of 0–0.2 mg/kg bw, based on histopathological changes in the kidney, accompanied by increases in absolute and relative renal weight in a 1-year chronic toxicity study in rats, applying a safety factor of 100 (10 for interspecies variability and 10 for intraspecies variability).		
Acute reference dose		JECFA established an ARfD of 0.3 mg/kg bw, based on a NOAEL of 30 mg/kg bw for clinical signs in dams observed in a developmental toxicity study in mice, with the application of a safety factor of 100 (10 for interspecies variability and 10 for intraspecies variability).		
Estimated chronic dietary exposure		The GECDE for the general population is 5.9 µg/kg bw per day, representing 3% of the upper bound of the ADI. The GECDE for children is 6.9 µg/kg bw per day, representing 3.4% of the upper bound of the ADI.		
Estimated acute dietary exposure		The GEADE was comparable for children and adults, being 2–224 µg/kg bw per day, representing 0.5–75% of the ARfD.		
Residue definition		The marker residue (MR) is the sum of 5-chloroquinolin-8-ol (5-CL), 5,7-dichloroquinolin-8-ol 5,7-DCL (5,7-DCL), and their glucuronide metabolites: 5-CLG (expressed as 5-CL equivalents) and 5,7-DCLG (expressed as 5,7-DCL equivalents).		
Maximum residue limits		JECFA recommended MRLs in swine of 40 µg/kg for muscle, 350 µg/kg for skin plus fat, 500 µg/kg for liver and 9000 µg/kg for kidney.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Swine	Muscle	40		44 (2021)
Swine	Skin plus fat	350		44 (2021)
Swine	Liver	500		44 (2021)
Swine	Kidney	9 000		44 (2021)

IMIDACLOPRID (neonicotinoid parasiticide)				
JECFA evaluation		94 (2022), 98 (2024)		
Acceptable daily intake		0–0.05 mg/kg bw, based on a NOAEL of 5.25 mg/kg bw per day for decreased body weight gain in an extended one-generation reproductive toxicity study in rats, with the application of a safety factor of 100 to allow for interspecies and intraspecies differences. (JECFA98)		
Acute reference dose		0.09 mg/kg bw based on a benchmark dose lower bound for a 5% response ($BMDL_{05}$) of 9 mg/kg bw for acute neurobehavioural effects in rats and a safety factor of 100 to allow for interspecies and intraspecies differences. (JECFA98)		
Estimated chronic dietary exposure		For Atlantic salmon only, the global estimates of chronic dietary exposure (GECDEs) are: • for adults and the elderly, 1.0 µg/kg bw per day; • for children and adolescents, 2.7 µg/kg bw per day;and • for infants and toddlers, 0.9 µg/kg bw per day (representing 2%, 5%, and 2%, respectively, of the upper bound of the ADI of 50 µg/kg bw). For all finfish, the GECDEs are: • for adults and the elderly, 1.8 µg/kg bw per day; • for children and adolescents, 3.8 µg/kg bw per day; and • for infants and toddlers, 1.2 µg/kg bw per day (representing 4%, 8%, and 2%, respectively, of the upper bound of the ADI of 50 µg/kg bw). The global estimate of acute dietary exposure (GEADE), based on consumption of Atlantic salmon, was 7% of the ARfD for adults and children (6.2 and 6.6 µg/kg bw, respectively); the GEADE for all finfish was 38% and 26% of the ARfD (34.1 and 23.8 µg/kg bw) for adults and children, respectively. (JECFA98)		
Residue definition		The marker residue (MR) for imidacloprid in finfish is the parent molecule, imidacloprid. (JECFA98)		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Finfish	Fillet	600	Muscle with skin in natural proportions and/or muscle.	47 (2024)

IMIDOCARB (antiprotozoal agent)				
JECFA evaluation		50 (1998); 60 (2003)		
Acceptable daily intake		0–10 µg/kg bw (JECFA50)		
Residue definition		Imidocarb		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	300		28 (2005)
Cattle	Liver	1 500		28 (2005)
Cattle	Kidney	2 000		28 (2005)
Cattle	Fat	50		28 (2005)
Cattle	Milk	50		28 (2005)

ISOMETAMIDIUM (trypanocide)				
JECFA evaluation		34 (1989); 40 (1992)		
Acceptable daily intake		0–100 µg/kg bw (JECFA40)		
Residue definition		Isometamidium		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	100		21 (1995)
Cattle	Liver	500		21 (1995)
Cattle	Kidney	1 000		21 (1995)
Cattle	Fat	100		21 (1995)
Cattle	Milk (µg/l)	100		21 (1995)

IVERMECTIN (broad-spectrum antiparasitic agent)				
JECFA evaluation	36 (1990); 40 (1992); 54 (2000); 58 (2002); 81 (2015); 94 (2021)			
Acceptable daily intake	0–10 µg/kg bw (JECFA81)			
Acute reference dose	200 µg/kg bw (JECFA81)			
Estimated acute dietary exposure	The GEADE for cattle muscle, applicable to children and the general population, is 69 µg/kg bw, representing 35% of the ARfD of 200 µg/kg bw. The GEADE for sheep muscle, applicable to children and the general population, is 73 µg/kg bw, representing 37% of the ARfD of 200 µg/kg bw. The GEADE for pig muscle, applicable to children and the general population, is 30 µg/kg bw, representing 15% of the ARfD of 200 µg/kg bw. (JECFA94)			
Estimated chronic dietary exposure	The GECDE for adults and the elderly is 0.72 µg/kg bw per day, representing 7.2% of the upper bound of the ADI of 10 µg/kg bw. The GECDE for children and adolescents is 0.93 µg/kg bw per day, representing 9.3% of the upper bound of the ADI of 10 µg/kg bw. The GECDE for infants and toddlers is 0.48 µg/kg bw per day, representing 4.8% of the upper bound of the ADI of 10 µg/kg bw. (JECFA94)			
Residue definition	Ivermectin B_{1a} The marker residue in sheep, pigs and goats is ivermectin B_{1a} (H_2B_{1a}, or *22,23*-dihydroavermectin B1a). (JECFA94)			
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	30		40 (2017)
Cattle	Liver	800		40 (2017)
Cattle	Kidney	100		40 (2017)
Cattle	Fat	400		40 (2017)
Cattle	Milk	10		26 (2003)
Pig	Muscle	15		46 (2023)
Pig	Liver	30		46 (2023)
Pig	Kidney	20		46 (2023)
Pig	Fat	50		46 (2023)
Sheep and goats	Muscle	30		46 (2023)
Sheep and goats	Liver	60		46 (2023)
Sheep and goats	Kidney	20		46 (2023)
Sheep and goats	Fat	100		46 (2023)

LASALOCID SODIUM (antiparasitic agent)	
JECFA evaluation	78 (2013)
Acceptable daily intake	0–5 µg/kg bw based on a NOAEL of 0.5 mg/kg bw per day from a developmental toxicity study in rabbits and a multigeneration reproductive toxicity study in rats, with application of an uncertainty factor of 100 for interspecies and intraspecies variability. (JECFA78)
Estimated dietary exposure	80 µg/person per day was calculated, representing approximately 27% of the upper bound of the ADI. (JECFA78)
Residue definition	Lasalocid A
Note9	JECFA78 extended the MRLs in chicken to turkey and quail and extrapolated the MRLs in chicken to pheasant. No information was available for duck, including on approved uses. According to the sponsor, the compound is not registered for use in laying hens, so it is not appropriate to recommend MRLs for eggs.

Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Chicken	Muscle	400		40 (2017)
Chicken	Liver	1 200		40 (2017)
Chicken	Kidney	600		40 (2017)
Chicken	Skin + Fat	600		40 (2017)
Turkey	Muscle	400		40 (2017)
Turkey	Liver	1 200		40 (2017)
Turkey	Kidney	600		40 (2017)
Turkey	Skin + Fat	600		40 (2017)
Quail	Muscle	400		40 (2017)
Quail	Liver	1 200		40 (2017)
Quail	Kidney	600		40 (2017)
Quail	Skin + Fat	600		40 (2017)
Pheasant	Muscle	400		40 (2017)
Pheasant	Liver	1 200		40 (2017)
Pheasant	Kidney	600		40 (2017)
Pheasant	Skin + Fat	600		40 (2017)

LEVAMISOLE (anthelmintic agent)				
JECFA evaluation		36 (1990); 42 (1994)		
Acceptable daily intake		0–6 µg/kg bw (JECFA42)		
Residue definition		Levamisole		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	10		22 (1997)
Cattle	Liver	100		22 (1997)
Cattle	Kidney	10		22 (1997)
Cattle	Fat	10		22 (1997)
Pig	Muscle	10		22 (1997)
Pig	Liver	100		22 (1997)
Pig	Kidney	10		22 (1997)
Pig	Fat	10		22 (1997)
Poultry	Muscle	10		22 (1997)
Poultry	Liver	100		22 (1997)
Poultry	Kidney	10		22 (1997)
Poultry	Fat	10		22 (1997)
Sheep	Muscle	10		22 (1997)
Sheep	Liver	100		22 (1997)
Sheep	Kidney	10		22 (1997)
Sheep	Fat	10		22 (1997)

LINCOMYCIN (antimicrobial agent)				
JECFA evaluation		54 (2000); 58 (2002); 62 (2004)		
Acceptable daily intake		0–30 µg/kg bw (JECFA54)		
Residue definition		Lincomycin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Milk	150		26 (2003)
Chicken	Muscle	200		26 (2003)
Chicken	Liver	500		26 (2003)
Chicken	Kidney	500		26 (2003)
Chicken	Fat	100	Additional MRL for skin with adhering fat of 300 µg/kg.	26 (2003)
Pig	Muscle	200		26 (2003)
Pig	Liver	500		26 (2003)
Pig	Kidney	1 500		26 (2003)
Pig	Fat	100	Additional MRL for skin with adhering fat of 300 µg/kg.	26 (2003)

LUFENURON (insecticide)				
JECFA evaluation		85 (2017)		
Acceptable daily intake		0–0.02 mg/kg bw based on the NOAEL of 1.93 mg/kg bw per day for tonic-clonic seizures and findings in lungs, gastrointestinal tract, liver, and urinary tract in a 2-year dietary study in rats and using a safety factor of 100 (10 for interspecies variability and 10 for intraspecies variability).		
Acute reference dose		Unnecessary, in view of lufenuron low acute oral toxicity and the absence of developmental toxicity and other toxicological effects likely to be elicited by a single dose.		
Estimated chronic dietary exposure		1.1 µg/kg bw per day (for the general population), representing 5.5% of the upper bound of the ADI. The overall dietary exposure was estimated as lufenuron is also used as a pesticide. The assumptions and detailed results will be displayed in the JECFA85 report. The results below are only for use as veterinary drugs.		
Residue definition		Lufenuron		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Salmon	Fillet	1 350	Muscle plus skin in a natural proportion.	41 (2018)
Trout	Fillet	1 350	Muscle plus skin in a natural proportion.	41 (2018)

MELENGESTROL ACETATE (production aid)				
JECFA evaluation		54 (2000); 58 (2002); 62 (2004); 66 (2006) 70 (2008)		
Acceptable daily intake		0–0.03 µg/kg bw (JECFA54)		
Residue definition		Melengestrol acetate		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	1		32 (2009)
Cattle	Liver	10		32 (2009)
Cattle	Kidney	2		32 (2009)
Cattle	Fat	18		32 (2009)

MONENSIN (antimicrobial agent)				
JECFA evaluation		70 (2008); 75 (2011)		
Acceptable daily intake		0–10 µg/kg bw based on a NOAEL of 1.14 mg/kg bw per day and a safety factor of 100 and rounding to one significant figure. (JECFA70)		
Estimated dietary exposure		Using the revised MRL, the TMDI from JECFA70 was recalculated, resulting in a value of 481 µg/person, representing 80% of the upper bound of the ADI. (JECFA75)		
Residue definition		Monensin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	10		32 (2009)
Cattle	Liver	100		35 (2012)
Cattle	Kidney	10		32 (2009)
Cattle	Fat	100		32 (2009)
Cattle	Milk	2		32 (2009)
Sheep	Muscle	10		32 (2009)
Sheep	Liver	20		32 (2009)
Sheep	Kidney	10		32 (2009)
Sheep	Fat	100		32 (2009)
Goats	Muscle	10		32 (2009)
Goats	Liver	20		32 (2009)
Goats	Kidney	10		32 (2009)
Goats	Fat	100		32 (2009)
Chicken	Muscle	10		32 (2009)
Chicken	Liver	10		32 (2009)
Chicken	Kidney	10		32 (2009)
Chicken	Fat	100		32 (2009)
Turkey	Muscle	10		32 (2009)
Turkey	Liver	10		32 (2009)
Turkey	Kidney	10		32 (2009)
Turkey	Fat	100		32 (2009)
Quail	Muscle	10		32 (2009)
Quail	Liver	10		32 (2009)
Quail	Kidney	10		32 (2009)
Quail	Fat	100		32 (2009)

MONEPANTEL (anthelmintic agent)				
JECFA evaluation		75 (2011); 78 (2013), 85 (2017)		
Acceptable daily intake		0–0.02 mg/kg bw based on the NOAEL of 1.93 mg/kg bw per day for tonic-clonic seizures and findings in lungs, gastrointestinal tract, liver, and urinary tract in a 2-year dietary study in rats, and using a safety factor of 100 (10 for interspecies variability and 10 for intraspecies variability)		
Acute reference dose		Unnecessary		
Estimated chronic dietary exposure		13.7 µg/kg bw per day (for the general population), which represents 68% of the upper bound of the ADI. 5.0 µg/kg bw per day (for children), which represents 22% of the upper bound of the ADI. 4.4 µg/kg bw per day (for infants), which represents 25% of the upper bound of the ADI.		
Residue definition		Monepantel sulfone, expressed as monepantel.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Sheep	Muscle	500		38 (2015)
Sheep	Liver	7 000		38 (2015)
Sheep	Kidney	1 700		38 (2015)
Sheep	Fat	13 000		38 (2015)
Cattle	Fat	7 000		41 (2018)
	Kidney	1 000		41 (2018)
	Liver	2 000		41 (2018)
	Muscle	300		41 (2018)

MOXIDECTIN (anthelmintic agent)				
JECFA evaluation		45 (1995); 47 (1996); 48 (1998); 50 (1998)		
Acceptable daily intake		0–2 µg/kg bw (JECFA45)		
Residue definition		Moxidectin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	20	Very high concentration and great variation in the level of residues at the injection site in cattle over a 49-day period after dosing.	22 (1997)
Cattle	Liver	100		22 (1997)
Cattle	Kidney	50		22 (1997)
Cattle	Fat	500		22 (1997)
Deer	Muscle	20		23 (1999)
Deer	Liver	100		23 (1999)
Deer	Kidney	50		23 (1999)
Deer	Fat	500		23 (1999)
Sheep	Muscle	50		22 (1997)
Sheep	Liver	100		22 (1997)
Sheep	Kidney	50		22 (1997)
Sheep	Fat	500		22 (1997)

NARASIN (antimicrobial agent)				
JECFA evaluation		70 (2008); 75 (2011)		
Acceptable daily intake		0–5 µg/kg bw based on a NOAEL of 0.5 mg/kg bw per day and a safety factor of 100. (JECFA70)		
Residue definition		Narasin A		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	15		35 (2012)
Cattle	Liver	50		35 (2012)
Cattle	Kidney	15		35 (2012)
Cattle	Fat	50		35 (2012)
Chicken	Muscle	15		32 (2009)
Chicken	Liver	50		32 (2009)
Chicken	Kidney	15		32 (2009)
Chicken	Fat	50		32 (2009)
Pig	Muscle	15		34 (2011)
Pig	Liver	50		34 (2011)
Pig	Kidney	15		34 (2011)
Pig	Fat	50		34 (2011)

NEOMYCIN (antimicrobial agent)				
JECFA evaluation		43 (1994); 47 (1996); 52 (1999); 58 (2002); 60 (2003)		
Acceptable daily intake		0–60 µg/kg bw (JECFA47)		
Residue definition		Neomycin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	500		23 (1999)
Cattle	Liver	500		28 (2005)
Cattle	Kidney	10 000		28 (2005)
Cattle	Fat	500		23 (1999)
Cattle	Milk	1 500		28 (2005)
Chicken	Muscle	500		23 (1999)
Chicken	Liver	500		23 (1999)
Chicken	Kidney	10 000		23 (1999)
Chicken	Fat	500		23 (1999)
Chicken	Eggs	500		23 (1999)
Duck	Muscle	500		23 (1999)
Duck	Liver	500		23 (1999)
Duck	Kidney	10 000		23 (1999)
Duck	Fat	500		23 (1999)
Goat	Muscle	500		23 (1999)
Goat	Liver	500		23 (1999)
Goat	Kidney	10 000		23 (1999)
Goat	Fat	500		23 (1999)
Pig	Muscle	500		23 (1999)
Pig	Liver	500		23 (1999)
Pig	Kidney	10 000		23 (1999)
Pig	Fat	500		23 (1999)
Sheep	Muscle	500		23 (1999)
Sheep	Liver	500		23 (1999)
Sheep	Kidney	10 000		23 (1999)
Sheep	Fat	500		23 (1999)
Turkey	Muscle	500		23 (1999)
Turkey	Liver	500		23 (1999)
Turkey	Kidney	10 000		23 (1999)
Turkey	Fat	500		23 (1999)

NICARBAZIN (coccidiostat)				
JECFA evaluation	50 (1998), 94 (2021)			
Acceptable daily intake	0–0.9 mg/kg bw based on toxicological effects (JECFA94)			
Acute reference dose	Not necessary (JECFA94)			
Estimated chronic dietary exposure	Based on incurred dinitrocarbanilide (DNC) residues in chicken muscle, offal and skin with fat, at 24 hours withdrawal time and 125 mg/kg feed: • the GECDE for adults and the elderly is 120 µg/kg bw per day, which represents 13% of the upper bound of the ADI of 900 µg/kg bw; • the GECDE for children and adolescents is 160 µg/kg bw per day, which represents 18% of the upper bound of the ADI of 900 µg/kg bw; and • the GECDE for infants and toddlers is 210 µg/kg bw per day, representing 23% of the upper bound of the ADI of 900 µg/kg bw. Based on incurred DNC residues in chicken muscle, offal, and skin with fat, at zero days withdrawal time and 50 mg/kg feed: • the GECDE for adults and the elderly is 95 µg/kg bw per day, which represents 11% of the upper bound of the ADI of 900 µg/kg bw; • the GECDE for children and adolescents is 120 µg/kg bw per day, which represents 14% of the upper bound of the ADI of 900 µg/kg bw; and • the GECDE for infants and toddlers is 160 µg/kg bw per day, representing 18% of the upper bound of the ADI of 900 µg/kg bw. (JECFA94)			
Microbiological effects	Nicarbazin and/or its metabolites show no antimicrobial activity towards representative bacteria of the human intestinal microbiota.			
Microbiological ADI	JECFA concluded that it was not necessary to establish an mADI for nicarbazin.			
Toxicological effects	The NOAEL was 60 mg/kg bw per day (equivalent to 42.5 mg/kg bw per day of DNC) due to prominent liver lobulation observed in a study of developmental toxicity in the rabbit.			
Uncertainty factor	When considering nicarbazin, it is DNC that is the toxic component, and its absorption alone or in a mixture with 2-hydroxy-4,6-dimethylpyrimidine (HDP) is substantially less (< 5%) than when formed from ingested nicarbazin. As DNC is the residue of concern and there is no nicarbazin in products from treated animals, JECFA concluded that despite limitations in the database, a reduction in the default safety factor of 100 used to account for interspecies and intraspecies variability would be justified. JECFA was unable to quantify just how much of a reduction would be appropriate but concluded that 50 could certainly be supported and would still result in a conservative evaluation.			
Toxicological acceptable daily intake	The tADI for nicarbazin was established at 0–0.9 mg/kg bw (DNC).			
Residue definition	The marker residue in chickens is 4,4´ DNC.			
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Chicken	Muscle	4 000	Broilers	23 (1999)
Chicken	Liver	15 000	Broilers	23 (1999)
Chicken	Kidney	8 000	Broilers	23 (1999)
Chicken	Fat/Skin (skin with fat)	4 000	Broilers	23 (1999)

PHOXIM (insecticide)				
JECFA evaluation		52 (1999); 62 (2004)		
Acceptable daily intake		0–4 µg/kg bw (JECFA52)		
Residue definition		Phoxim		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Goat	Muscle	50		26 (2003)
Goat	Liver	50		26 (2003)
Goat	Kidney	50		26 (2003)
Goat	Fat	400		26 (2003)
Pig	Muscle	50		26 (2003)
Pig	Liver	50		26 (2003)
Pig	Kidney	50		26 (2003)
Pig	Fat	400		26 (2003)
Sheep	Muscle	50		26 (2003)
Sheep	Liver	50		26 (2003)
Sheep	Kidney	50		26 (2003)
Sheep	Fat	400		26 (2003)

PIRLIMYCIN (antimicrobial agent)				
JECFA evaluation		62 (2004)		
Acceptable daily intake		0–8 µg/kg bw (JECFA62)		
Residue definition		Pirlimycin		
Species	**Tissue**	**MRL (µg/kg)**	**Note**	**CAC**
Cattle	Muscle	100		29 (2006)
Cattle	Liver	1 000		29 (2006)
Cattle	Kidney	400		29 (2006)
Cattle	Fat	100		29 (2006)
Cattle	Milk	100	JECFA evaluated the effect of pirlimycin residues on starter cultures and, for this reason, recommended an MRL of 100 µg/kg of milk. Codex Members may, therefore, adapt national/regional MRLs to address this technological aspect for the trade of fresh liquid milk intended for processing using a starter culture.	29 (2006)

PORCINE SOMATOTROPIN (production aid)				
JECFA evaluation		52 (1999)		
Acceptable daily intake		Not specified (JECFA52)		
Residue definition		Not applicable		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Pig	Muscle	Not specified		26 (2003)
Pig	Liver	Not specified		26 (2003)
Pig	Kidney	Not specified		26 (2003)
Pig	Fat	Not specified		26 (2003)

PROGESTERONE (production aid)				
JECFA evaluation		25 (1981); 32 (1987); 52 (1999)		
Acceptable daily intake		0–30 µg/kg bw (JECFA52)		
Residue definition		Progesterone		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (2005)
Cattle	Liver	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (2005)
Cattle	Kidney	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (2005)
Cattle	Fat	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (2005)

RACTOPAMINE (production aid)				
JECFA evaluation		40 (1992); 62 (2004); 66 (2006)		
Acceptable daily intake		0–1 µg/kg bw (JECFA66)		
Residue definition		Ractopamine		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	10		35 (2012)
Cattle	Liver	40		35 (2012)
Cattle	Kidney	90		35 (2012)
Cattle	Fat	10		35 (2012)
Pig	Muscle	10		35 (2012)
Pig	Liver	40		35 (2012)
Pig	Kidney	90		35 (2012)
Pig	Fat	10	The MRL includes skin + fat	35 (2012)

SARAFLOXACIN (antimicrobial agent)				
JECFA evaluation		50 (1998)		
Acceptable daily intake		0–0.3 µg/kg bw (JECFA50)		
Residue definition		Sarafloxacin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Chicken	Muscle	10		24 (2001)
Chicken	Liver	80		24 (2001)
Chicken	Kidney	80		24 (2001)
Chicken	Fat	20		24 (2001)
Turkey	Muscle	10		24 (2001)
Turkey	Liver	80		24 (2001)
Turkey	Kidney	80		24 (2001)
Turkey	Fat	20		24 (2001)

SPECTINOMYCIN (antimicrobial agent)				
JECFA evaluation		42 (1994); 50 (1998)		
Acceptable daily intake		0–40 µg/kg bw (JECFA42)		
Residue definition		Spectinomycin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	500		23 (1999)
Cattle	Liver	2 000		23 (1999)
Cattle	Kidney	5 000		23 (1999)
Cattle	Fat	2 000		23 (1999)
Cattle	Milk (µg/l)	200		23 (1999)
Chicken	Muscle	500		23 (1999)
Chicken	Liver	2 000		23 (1999)
Chicken	Kidney	5 000		23 (1999)
Chicken	Fat	2 000		23 (1999)
Chicken	Eggs	2 000		23 (1999)
Pig	Muscle	500		23 (1999)
Pig	Liver	2 000		23 (1999)
Pig	Kidney	5 000		23 (1999)
Pig	Fat	2 000		23 (1999)
Sheep	Muscle	500		23 (1999)
Sheep	Liver	2 000		23 (1999)
Sheep	Kidney	5 000		23 (1999)
Sheep	Fat	2 000		23 (1999)

SPIRAMYCIN (antimicrobial agent)				
JECFA evaluation		38 (1991); 43 (1994); 47 (1996); 48 (1997)		
Acceptable daily intake		0–50 µg/kg bw (JECFA43)		
Residue definition		Cattle and chickens, the sum of spiramycin and neospiramycin; pigs, spiramycin equivalents (antimicrobially active residues).		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	200		22 (1997)
Cattle	Liver	600		22 (1997)
Cattle	Kidney	300		22 (1997)
Cattle	Fat	300		22 (1997)
Cattle	Milk (µg/l)	200		22 (1997)
Chicken	Muscle	200		22 (1997)
Chicken	Liver	600		22 (1997)
Chicken	Kidney	800		22 (1997)
Chicken	Fat	300		22 (1997)
Pig	Muscle	200		22 (1997)
Pig	Liver	600		22 (1997)
Pig	Kidney	300		22 (1997)
Pig	Fat	300		22 (1997)

SULFADIMIDINE (antimicrobial agent)				
JECFA evaluation		34 (1989); 38 (1991); 42 (1994)		
Acceptable daily intake		0–50 µg/kg bw (JECFA42)		
Residue definition		Sulfadimidine		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Milk (µg/l)	25		21 (1995)
Not specified	Muscle	100		21 (1995)
Not specified	Liver	100		21 (1995)
Not specified	Kidney	100		21 (1995)
Not specified	Fat	100		21 (1995)

TEFLUBENZURON (insecticide)				
JECFA evaluation		81 (2015)		
Acceptable daily intake		0–5 µg/kg bw based on a lower 95% confidence limit on the benchmark dose for a 10% response (BMDL10) of 0.54 mg/kg bw per day for hepatocellular hypertrophy in male mice observed in a carcinogenicity study, with the application of an uncertainty factor of 100 to account for interspecies and intraspecies variability. (JECFA81)		
Estimated chronic dietary exposure		The EDI is 42.9 µg/person per day, based on a 60 kg individual, representing approximately 14% of the upper bound of the ADI. The GECDE for the general population is 1.6 µg/kg bw per day, representing 31% of the upper bound of the ADI. The GECDE for children is 2.1 µg/kg bw per day, representing 43% of the upper bound of the ADI. The GECDE for infants is 0.9 µg/kg bw per day, representing 18% of the upper bound of the ADI. (JECFA81)		
Residue definition		Teflubenzuron		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Salmon	Muscle	400		40 (2017)
Salmon	Fillet	400	Muscle plus skin in a natural proportion.	40 (2017)

TESTOSTERONE (production aid)				
JECFA evaluation		25 (1981); 32 (1987); 52 (1999)		
Acceptable daily intake		0–2 µg/kg bw (JECFA52)		
Residue definition		Testosterone		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)
Cattle	Liver	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)
Cattle	Kidney	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)
Cattle	Fat	Unnecessary	Residues resulting from the use of this substance as a growth promoter in accordance with good animal husbandry practice are unlikely to pose a hazard to human health.	21 (1995)

THIABENDAZOLE (anthelmintic agent)				
JECFA evaluation		40 (1992); 48 (1997); 58 (2002)		
Acceptable daily intake		0–100 µg/kg bw (JECFA40)		
Residue definition		Sum of thiabendazole and 5-hydroxythiabendazole		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Cattle	Liver	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Cattle	Kidney	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Cattle	Fat	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Cattle	Milk (µg/l)	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Goat	Muscle	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Goat	Liver	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Goat	Kidney	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Goat	Fat	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Goat	Milk (µg/l)	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Pig	Muscle	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Pig	Liver	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Pig	Kidney	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Pig	Fat	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Sheep	Muscle	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Sheep	Liver	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Sheep	Kidney	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)
Sheep	Fat	100	The MRL also covers residues derived from feed containing the residues resulting from agricultural use.	21 (1995)

TILMICOSIN (antimicrobial agent)				
JECFA evaluation		47 (1996); 54 (2000); 70 (2008)		
Acceptable daily intake		0–40 µg/kg bw (JECFA47)		
Residue definition		Tilmicosin		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	100		23 (1999)
Cattle	Liver	1 000		23 (1999)
Cattle	Kidney	300		23 (1999)
Cattle	Fat	100		23 (1999)
Chicken	Muscle	150		34 (2011)
Chicken	Liver	2 400		34 (2011)
Chicken	Kidney	600		34 (2011)
Chicken	Skin/Fat	250		34 (2011)
Pig	Muscle	100		23 (1999)
Pig	Liver	1 500		23 (1999)
Pig	Kidney	1 000		23 (1999)
Pig	Fat	100		23 (1999)
Sheep	Muscle	100		23 (1999)
Sheep	Liver	1 000		23 (1999)
Sheep	Kidney	300		23 (1999)
Sheep	Fat	100		23 (1999)
Turkey	Muscle	100		34 (2011)
Turkey	Kidney	1 200		34 (2011)
Turkey	Liver	1 400		34 (2011)
Turkey	Skin/Fat	250		34 (2011)

TRENBOLONE ACETATE (growth promoter)				
JECFA evaluation		26 (1982); 27 (1983); 32 (1987); 34 (1989)		
Acceptable daily intake		0–0.02 µg/kg bw (JECFA34)		
Residue definition		Cattle muscle, beta-trenbolone; Cattle liver, alpha-trenbolone.		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	2		21 (1995)
Cattle	Liver	10		21 (1995)

TRICHLORFON (Metrifonate) (insecticide)				
JECFA evaluation		54 (2000); 60 (2003); 66 (2006)		
Acceptable daily intake		0–2 µg/kg bw (JECFA60)		
Residue definition		JECFA54 confirmed the MRL for cows' milk and the guidance levels for muscle, liver, kidney, and fat of cattle recommended (WHO TRS 900, 2001).		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Milk	50		29 (2006)

TRICLABENDAZOLE (anthelmintic agent)				
JECFA evaluation		40 (1992); 66 (2006); 70 (2008)		
Acceptable daily intake		0–3 µg/kg bw (JECFA40)		
Residue definition		Ketotriclabnedazole		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	250		32 (2009)
Cattle	Liver	850		32 (2009)
Cattle	Kidney	400		32 (2009)
Cattle	Fat	100		32 (2009)
Sheep	Muscle	200		32 (2009)
Sheep	Liver	300		32 (2009)
Sheep	Kidney	200		32 (2009)
Sheep	Fat	100		32 (2009)

TYLOSIN (antimicrobial agent)				
JECFA evaluation		70 (2008)		
Acceptable daily intake		0–30 µg/kg bw based on a microbiological end-point derived from in vitro minimum inhibitory concentration (MIC) susceptibility testing and faecal binding data (MICcalc = 1.698). (JECFA70)		
Residue definition		Tylosin A		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	100		32 (2009)
Cattle	Liver	100		32 (2009)
Cattle	Kidney	100		32 (2009)
Cattle	Fat	100		32 (2009)
Cattle	Milk	100		32 (2009)
Pig	Muscle	100		32 (2009)
Pig	Liver	100		32 (2009)
Pig	Kidney	100		32 (2009)
Pig	Fat	100		32 (2009)
Chicken	Muscle	100		32 (2009)
Chicken	Liver	100		32 (2009)
Chicken	Kidney	100		32 (2009)
Chicken	Fat/Skin	100		32 (2009)
Chicken	Eggs	300		32 (2009)

ZERANOL (growth promoter)				
JECFA evaluation		26 (1982); 27 (1983); 32 (1987)		
Acceptable daily intake		0–0.5 µg/kg bw (JECFA32)		
Residue definition		Zeranol		
Species	**Tissue**	**MRL (µg/kg)**	**Notes**	**CAC**
Cattle	Muscle	2		21 (1995)
Cattle	Liver	10		21 (1995)

ZILPATEROL HYDROCHLORIDE	(β2-adrenoceptor agonist)
JECFA evaluation	81 (2015), 85 (2017)
Acceptable daily intake	ADI is 0–0.04 µg/kg bw established at JECFA78 (WHO TRS No. 988, 2014) and reaffirmed at JECFA81 and JECFA85.
Acute reference dose	ARfD is 0.04 µg/kg bw based on a LOAEL of 0.76 µg/kg bw for acute pharmacological effects observed in a single-dose human study, with the application of an uncertainty factor of 20, comprising a default uncertainty factor of 10 for human individual variability and an additional uncertainty factor of 2 to account for use of a LOAEL for a slight effect instead of a NOAEL (JECFA81).
Global estimated acute dietary exposure	The GEADE is 1.9 µg/day for the general population, representing approximately 80% of the ARfD. The GEADE is 0.57 µg/day for children, representing approximately 94% of the ARfD (JECFA81).
Residue definition	Zilpaterol (free base) in muscle, liver, and kidney.

Species	Tissue	MRL (µg/kg)	Notes	CAC
Cattle	Kidney	3.3		46 (2023)
Cattle	Liver	3.5		46 (2023)
Cattle	Muscle	0.5		46 (2023)

PART II

MAXIMUM RESIDUE LIMITS FOR RESIDUES OF VETERINARY DRUGS IN FOODS EXTRAPOLATED IN ACCORDANCE WITH THE APPROACH FOR THE EXTRAPOLATION OF MRLs FOR VETERINARY DRUGS TO ONE OR MORE SPECIES

Extrapolation to ruminants

AMOXICILLIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	50	MRL extrapolated	46 (2023)
All other ruminants	Fat	50	MRL extrapolated	46 (2023)
All other ruminants	Liver	50	MRL extrapolated	46 (2023)
All other ruminants	Kidney	50	MRL extrapolated	46 (2023)
All other ruminants	Milk	4	MRL extrapolated	46 (2023)

BENZYLPENICILLIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	50	MRL extrapolated	46 (2023)
All other ruminants	Liver	50	MRL extrapolated	46 (2023)
All other ruminants	Kidney	50	MRL extrapolated	46 (2023)
All other ruminants	Milk	4	MRL extrapolated	46 (2023)

CYHALOTHRIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	20	MRL extrapolated	46 (2023)
All other ruminants	Fat	400	MRL extrapolated	46 (2023)
All other ruminants	Liver	20	MRL extrapolated	46 (2023)
All other ruminants	Kidney	20	MRL extrapolated	46 (2023)
All other ruminants	Milk	30	MRL extrapolated	46 (2023)

CYPERMETHRIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	50	MRL extrapolated	46 (2023)
All other ruminants	Fat	1 000	MRL extrapolated	46 (2023)
All other ruminants	Liver	50	MRL extrapolated	46 (2023)
All other ruminants	Kidney	50	MRL extrapolated	46 (2023)

DELTAMETHRIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	30	MRL extrapolated	46 (2023)
All other ruminants	Fat	500	MRL extrapolated	46 (2023)
All other ruminants	Liver	50	MRL extrapolated	46 (2023)
All other ruminants	Kidney	50	MRL extrapolated	46 (2023)

LEVAMISOLE

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	10	MRL extrapolated	46 (2023)
All other ruminants	Fat	10	MRL extrapolated	46 (2023)
All other ruminants	Liver	100	MRL extrapolated	46 (2023)
All other ruminants	Kidney	10	MRL extrapolated	46 (2023)

IVERMECTIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Milk	10	MRL extrapolated.	47 (2024)

MOXIDECTIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	20	MRL extrapolated	46 (2023)
All other ruminants	Fat	500	MRL extrapolated	46 (2023)
All other ruminants	Liver	100	MRL extrapolated	46 (2023)
All other ruminants	Kidney	50	MRL extrapolated	46 (2023)

SPECTINOMYCIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	500	MRL extrapolated	46 (2023)
All other ruminants	Fat	2 000	MRL extrapolated	46 (2023)
All other ruminants	Liver	2 000	MRL extrapolated	46 (2023)
All other ruminants	Kidney	5 000	MRL extrapolated	46 (2023)
All other ruminants	Milk	200	MRL extrapolated	46 (2023)

TETRACYCLINES

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	200	MRL extrapolated	46 (2023)
All other ruminants	Liver	600	MRL extrapolated	46 (2023)
All other ruminants	Kidney	1 200	MRL extrapolated	46 (2023)
All other ruminants	Milk	100	MRL extrapolated	46 (2023)

TILMICOSIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other ruminants	Muscle	100	MRL extrapolated	46 (2023)
All other ruminants	Fat	100	MRL extrapolated	46 (2023)
All other ruminants	Liver	1 000	MRL extrapolated	46 (2023)
All other ruminants	Kidney	300	MRL extrapolated	46 (2023)

Extrapolation to finfish

EMAMECTIN BENZOATE

Species	Tissue	MRL (µg/kg)	Note	CAC
All other finfish	Muscle and fillet	100	Muscle plus skin in a natural proportion. MRL extrapolated.	47 (2024)

DELTAMETHRIN

Species	Tissue	MRL (µg/kg)	Note	CAC
All other finfish	Muscle	30	MRL extrapolated	46 (2023)

FLUMEQUINE

Species	Tissue	MRL (µg/kg)	Note	CAC
All other finfish	Muscle	500	MRL extrapolated	46 (2023)

LUFENURON

Species	Tissue	MRL (µg/kg)	Note	CAC
All other finfish	Fillet	1 350	Muscle plus skin in a natural proportion. MRL extrapolated.	47 (2024)

PART III

RISK MANAGEMENT RECOMMENDATIONS (RMRs) FOR RESIDUES OF VETERINARY DRUGS

CARBADOX (growth promoter)

JECFA evaluation: 36 (1990); 60 (2003)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the JECFA conclusions on the available scientific information, there is no safe level of residues of carbadox or its metabolites in food that represents an acceptable risk to consumers. For this reason, competent authorities should prevent residues of carbadox in food. This can be accomplished by not using carbadox in food-producing animals.

CHLORAMPHENICOL (antimicrobial agent)

JECFA evaluation: 12 (1968); 32 (1987); 42 (1994); 62 (2004)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the JECFA conclusions on the available scientific information, there is no safe level of residues of chloramphenicol or its metabolites in food that represents an acceptable risk to consumers. For this reason, competent authorities should prevent residues of chloramphenicol in food. This can be accomplished by not using chloramphenicol in food-producing animals.

CHLORPROMAZINE (tranquillizer agent)

JECFA evaluation: 38 (1991)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the JECFA conclusions, although insufficient data were available or there was a lack of data to establish a safe level of residues of chlorpromazine or its metabolites in food representing an acceptable risk to consumers, significant health concerns were identified. For this reason, competent authorities should prevent residues of chlorpromazine in food. This can be accomplished by not using chlorpromazine in food-producing animals.

DIMETRIDAZOLE (antiprotozoal agent)

JECFA evaluation: 34 (1989)

CAC adoption: 38 (2015)

Recommended risk management measures

In view of the JECFA conclusions, although insufficient data were available or there was a lack of data to establish a safe level of residues of dimetridazole or its metabolites in food representing an acceptable risk to consumers, significant health concerns were identified. For this reason, competent authorities should prevent residues of dimetridazole in food. This can be accomplished by not using dimetridazole in food-producing animals.

FURAZOLIDONE (antimicrobial agent)

JECFA evaluation: 40 (1992)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the JECFA conclusions on the available scientific information, there is no safe level of residues of furazolidone or its metabolites in food that represents an acceptable risk to consumers. For this reason, competent authorities should prevent residues of furazolidone in food. This can be accomplished by not using furazolidone in food-producing animals.

GENTIAN VIOLET (antibacterial, antifungal and anthelminthic agent)

JECFA evaluation: 78 (2013)

CAC adoption: 41 (2018)

Recommended risk management measures

In view of the JECFA conclusions on the available scientific information, there is no safe level of residues of gentian violet or its metabolites in food that represents an acceptable risk to consumers. For this reason, competent authorities should prevent residues of gentian violet in food. This can be accomplished by not using gentian violet in food-producing animals.

IPRONIDAZOLE (antiprotozoal agent)

JECFA evaluation: 34 (1989)

CAC adoption: 38 (2015)

Recommended risk management measures

In view of the JECFA conclusions, although insufficient data were available or there was a lack of data to establish a safe level of residues of ipronidazole or its metabolites in food representing an acceptable risk to consumers, significant health concerns were identified. For this reason, competent authorities should prevent residues of ipronidazole in food. This can be accomplished by not using ipronidazole in food-producing animals.

MALACHITE GREEN (antifungal and antiprotozoal agent)

JECFA evaluation: 70 (2008)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the JECFA conclusions on the available scientific information, there is no safe level of residues of malachite green or its metabolites in food that represents an acceptable risk to consumers. For this reason, competent authorities should prevent residues of malachite green in food. This can be accomplished by not using malachite green in food-producing animals.

METRONIDAZOLE (antiprotozoal agent)

JECFA evaluation: 34 (1989)

CAC adoption: 38 (2015)

Recommended risk management measures

In view of the JECFA conclusions, although insufficient data were available or there was a lack of data to establish a safe level of residues of metronidazole or its metabolites in food representing an acceptable risk to consumers, significant health concerns were identified. For this reason, competent authorities should prevent residues of metronidazole in food. This can be accomplished by not using metronidazole in food-producing animals.

NITROFURAL (antimicrobial agent)

JECFA evaluation: 40 (1992)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the JECFA conclusions, although insufficient data were available or there was a lack of data to establish a safe level of residues of nitrofural or its metabolites* in food representing an acceptable risk to consumers, significant health concerns were identified. For this reason, competent authorities should prevent residues of nitrofural in food. This can be accomplished by not using nitrofural in food-producing animals.

* Semicarbazide is not a unique indicator of nitrofural use and low levels can be associated with other legitimate sources.

OLAQUINDOX (antibacterial agent)

JECFA evaluation: 36 (1990); 42 (1994)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the JECFA conclusions, although insufficient data were available or there was a lack of data to establish a safe level of residues of olaquindox or its metabolites in food representing an acceptable risk to consumers, significant health concerns were identified. For this reason, competent authorities should prevent residues of olaquindox in food. This can be accomplished by not using olaquindox in food-producing animals.

RONIDAZOLE (antiprotozoal agent)

JECFA evaluation: 34 (1989); 42 (1994)

CAC adoption: 38 (2015)

Recommended risk management measures

In view of the JECFA conclusions, although insufficient data were available or there was a lack of data to establish a safe level of residues of ronidazole or its metabolites in food representing an acceptable risk to consumers, significant health concerns were identified. For this reason, competent authorities should prevent residues of ronidazole in food. This can be accomplished by not using ronidazole in food-producing animals.

STILBENES (growth promoter)

JECFA evaluation: 5 (1960)

IARC evaluation: monograph 100 AA (2012)

CAC adoption: 37 (2014)

Recommended risk management measures

In view of the available scientific information, there is no safe level of residues of stilbenes or their metabolites in food that represents an acceptable risk to consumers. For this reason, competent authorities should prevent residues of stilbenes in food. This can be accomplished by not using stilbenes in food-producing animals.