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EURL GUIDANCE ON MINIMUM METHOD PERFORMANCE REQUIREMENTS (MMPRs) FOR SPECIFIC PHARMACOLOGICALLY ACTIVE SUBSTANCES IN SPECIFIC ANIMAL MATRICES

The purpose of this technical guidance is to improve and harmonise the performance of analytical methods used for the analysis of residues of unauthorised or prohibited pharmacologically active substances and for authorised pharmacologically active substances in matrices or species for which no use is authorised, taking into account state-of-the-art analytical methods.

Definitions

This document is a technical guidance for analytical methods in residue control which lists the minimum concentrations that official laboratories should be able to reliably identify. This is done by defining minimum method performance requirements (MMPRs). MMPRs should by no means be considered as enforcement limits but as analytical benchmarks. In case certain laboratories can identify lower concentrations in accordance with the method requirements established in Commission Implementing Regulation (EU) 2021/808, competent authorities should in almost all cases (except thiouracil) also enforce lower concentrations of residues of prohibited or unauthorised pharmacologically active substances.

This guidance addresses the requirements for methods used in official control plans drawn up in accordance with Commission Delegated Regulation (EU) 2022/1644[1] and Commission Implementing Regulation (EU) 2022/1646[2]. They apply to all related official controls carried out on residues of pharmacologically active substances in live animals, their body parts and fluids, excreta, tissues, products of animal origin and animal by-products. This also includes drinking water and feed when sampled as part of the above-mentioned official control plans, e.g. as part of follow-up measures.

Prohibited or unauthorised pharmacologically active substances

For prohibited or unauthorised pharmacologically active substances this document specifies MMPRs for specific substances in specific food and non-food (e.g. body parts and fluids, excrements, when taken as part of official control plans, see above) matrices.

[1] CDR (EU) 2022/1644 supplementing Regulation (EU) 2017/625 of the European Parliament and of the Council with specific requirements for the performance of official controls on the use of pharmacologically active substances authorised as veterinary medicinal products or as feed additives and of prohibited or unauthorised pharmacologically active substances and residues thereof.

[2] CIR (EU) 2022/1646 on uniform practical arrangements for the performance of official controls as regards the use of pharmacologically active substances authorised as veterinary medicinal products or as feed additives and of prohibited or unauthorised pharmacologically active substances and residues thereof, on specific content of multi-annual national control plans and specific arrangements for their preparation.

For some prohibited or unauthorised pharmacologically active substances, also reference points for action (RPAs) in food have been set under Regulation (EU) 2019/1871. For substances for which RPAs are established in food, this document adopts these values as MMPRs and also defines MMPRs in food and non-food matrices (e.g., body parts and fluids, excreta) for these substances.
Food of animal origin, containing residues of a pharmacologically active substance in a concentration at or above the reference point for action, shall be considered not to comply with Union legislation and shall not enter the food chain. By consequence, the RPAs also define the minimum method performance requirements (MMPRs) for these substances in food. However, when laboratories can reliably identify these substances at lower concentrations, these concentrations shall lead to follow-up investigations for verifying whether an illegal treatment took place (Art. 6 of Regulation (EU) 2019/1871).

Authorised pharmacologically active substances

For authorised pharmacologically active substances[3], for which no MRL has been set in a specific matrix or species, for those matrices/species, the MMPR is 1/4th of the cascade MRL, established under Regulation (EU) 2018/470 for the concerned substance. The MMPR requirement '1/4th of the cascade MRL' requires, in principle, a spike level of down to 0.1 times the cascade MRL (which is in line with Commission Implementing Regulation (EU) 2021/808 consolidated version including CIR (EU) 2024/2052 and CIR (EU)2025/127), where analytically feasible.

Instructions for use
Laboratories should ensure that the CCβ for screening methods and the CCα for confirmatory methods is lower than the MMPR, knowing well that minor exceedances are possible in individual cases with multi-methods.

The tables below list in bold preferred substances / species / matrices which are from the EURL point of view important for residue control. The listed substances are considered as minimum required (in **bold letters)** and/or recommended substances, however not all possible compounds per group are given. Hence for each substance group a default value for MMPR is given for presently not listed compounds. These values can serve as a starting point for developing analytical methods and - depending on analytical feasibility - can be updated/adjusted in the future. Even if "all other compounds" are listed in the tables, this does not automatically mean high priority, but requires individual assessment in case of doubt.
For practical reasons, all concentrations in the tables below are given in µg/kg with two significant figures.

For further technical assistance on how to improve analytical methods to reach the MMPRs, the EURL responsible for the substance should be consulted.

[3] Substances included in Table 1 of the Annex to Regulation (EU) No 37/2010 or pharmacologically active substances that are authorised as a feed additive under Regulation (EC) No 1831/2003.

EURL Name and Substance Groups	Address
Common EURL Portal	https://eurl-residues.eu
ANSES-EURL	
Group A A2a Chloramphenicol A2b Nitrofurans A2d Others like Dapsone (depending on structures) A3a Pharmacologically active dyes A3b Biocides as defined in Regulation (EU) No 528/2012 which may be used in animal husbandry of food-producing animals A3c Antimicrobial substances Group B B1a Antibacterial substances, including sulphonamides and quinolones	ANSES - Laboratoire de Fougères La Haute Marche – Javené – BP 90203 F-35302 Fougères, France Phone: +33(0)2 99 17 27 47 Director: Dr. Eric Verdon email: eurl-vmpr-fougeres@anses.fr https://eurl-veterinaryresidues.anses.fr

BVL-EURL	
Group A A1e Beta-agonists A2c Dimetridazole, metronidazole, ronidazole and other nitro-imidazoles A3b Plant protection products as defined in Regulation (EU) No 1107/2009 A3d Coccidiostats, histomonostats and other antiparasitic agents A3f Anti-inflammatory substances, (…) and any other pharmacologically active substances **Group B** B1b Insecticides, fungicides, anthelmintics and other antiparasitic agents B1d Non-steroidal anti-inflammatory drugs (NSAIDs), (…) B2 Coccidiostats and histomonostats A2d / B1e – other (depending on structures)	Bundesamt für Verbraucherschutz und Lebensmittelsicherheit Diedersdorfer Weg 1 12277 Berlin, Germany Phone: + 49(0)30 18444-50200 Fax: + 49(0)30 18444-50099 Director: Dr. Joachim Polzer email: eurlvetdrug@bvl.bund.de https://www.bvl.bund.de/EN/Tasks/09_Laboratories/01_Tasks/02_reference_laboratories/01_reference_laboratories_EURL/reference_laboratories_EU_node.html password protected webpage, also in English: https://fis-vl.bvl.bund.de/share/page/

WFSR-EURL	
Group A A1a Stilbenes A1b Antithyroid agents A1c Steroids A1d Resorcylic acid lactones, including zeranol A2d Other substances, chlorpromazine A3e Protein and peptide hormones A3f Sedatives A3g Antiviral substances **Group B** B1c Sedatives B1d Corticosteroids and glucocorticosteroids	Wageningen Food Safety Research P.O. Box 230 6700 AE Wageningen, The Netherlands Phone: + 31(0)317 480256 Director: Drs. Saskia S. Sterk email: eurl.growthpromoters@wur.nl Saskia.sterk@wur.nl https://www.eurl-growthpromoters.eu/

1. A1a Stilbenes

For the purpose of control, the matrices of choice are urine, followed by liver.
Muscle has been included for the control of imports and (imported) aquaculture products, but it is not the matrix of choice for routine plans, as the concentrations of residues are very low in muscle.
The table below lists stilbenes for which analysis is minimum required or recommended. For all other stilbenes, a default MMPR value of 1.0 µg/kg applies for urine, liver and muscle.

Substances	Matrix	MMPR
Diethylstilbestrol (DES) **Dienestrol (DE)**	**Urine**	0.5 µg/kg for DES 1.0 µg/kg for DE, HEX, BENZ
Hexestrol (HEX)	**Liver**	1.0 µg/kg (for all substances)
Benzestrol (BENZ)	Muscle (including fish)	1.0 µg/kg (for all substances)
All other stilbenes	**Urine, liver**, muscle (including fish)	1.0 µg/kg

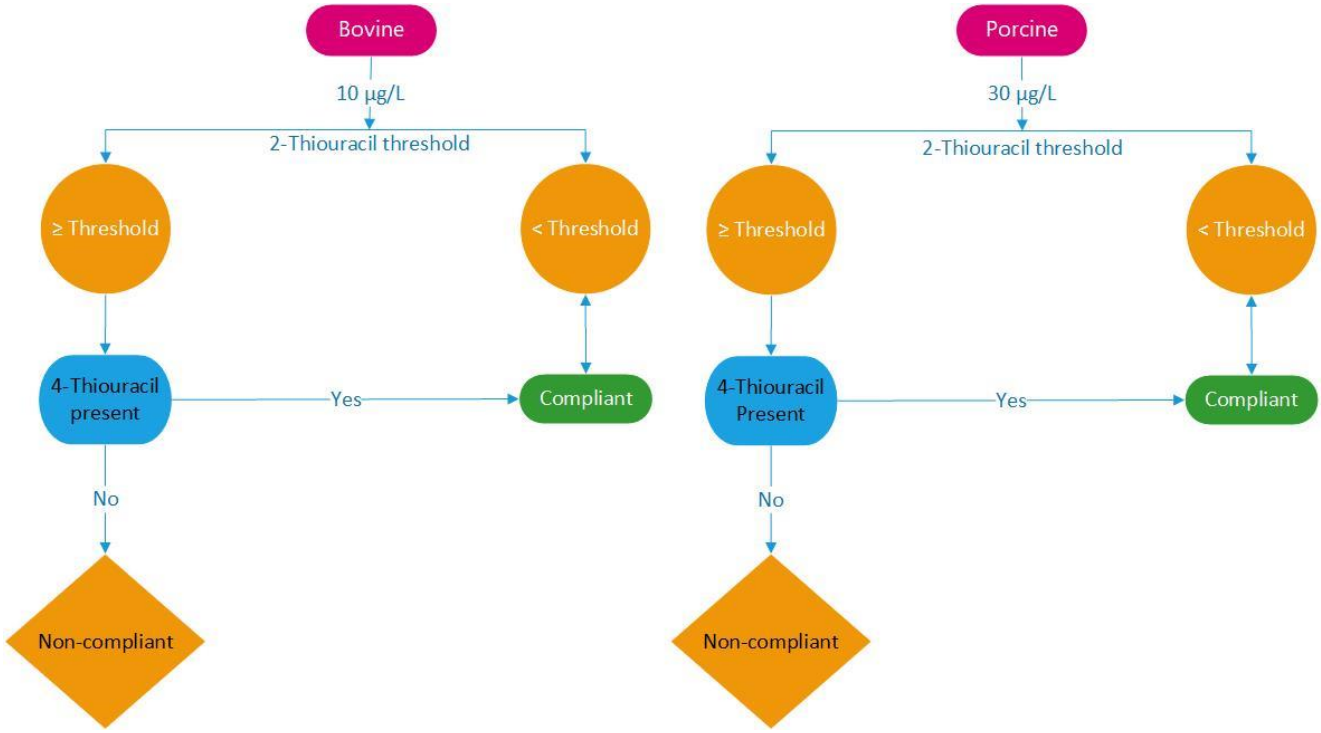
2. A1b Antithyroid agents

For the purpose of control, the matrices of choice are urine and thyroid gland. Muscle has been included for the control of imports and (imported) aquaculture products, but it is not the matrix of choice for routine plans, as the concentrations of residues are very low in muscle.
It should be noted that low concentrations of thiouracil have been detected in animals fed a diet containing cruciferous plants.
For bovine and porcine urine samples a strategy is presented. See flowchart below. The table below lists antithyroid agents for which analysis is minimum required or recommended.
For all other antithyroid agents, and other species than bovine and porcine a MMPR value of 5.0 µg/kg in urine or 10.0 µg/kg in thyroid gland applies.

Substances	Matrix	MMPR
2-Thiouracil* **4-Thiouracil*** **6-Methylthiouracil** **Propylthiouracil** **Tapazol** **Benzylthiouracil** **Phenylthiouracil** 5-Methylthiouracil Dimethylthiouracil Ethylthiouracil	**Urine**	5.0 µg/kg
	Thyroid gland[#]	10.0 µg/kg
	Muscle (including fish)	10.0 µg/kg
All other thyrostats in bovine and porcine and all thyrostats (including the ones above) in ovine, caprine and equine matrices	**Urine**	5.0 µg/kg
	Thyroid gland#, muscle (including fish)	10.0 µg/kg

[#] *For thyroid gland, no reference values are available. EURL-WFSR cannot propose an enforcement strategy.*

Low concentrations of thiouracil have been detected in bovine and porcine animals fed with cruciferous plants. However, there is scientific evidence showing that levels above 10 µg/kg for bovine and 30 µg/kg for porcine in urine have a low chance of being linked to a natural origin due to this contamination. There are, however, cases where 10 or 30 µg/kg is exceeded for thiouracil and no exogenous source could be found. See 'Discrimination between the exogenous and endogenous origin of thiouracil in farm animals, the final chapter'. Marco H. Blokland, Frederike E. van Tricht, Maria J. Groot, Leendert A. Van Ginkel & Saskia S. Sterk, Food Additives and contaminants Part A, 2021, Vol. 38, No 12, 2077-2090. For the latest strategies, consult EURL Reflection Paper 2.0.



Flowchart Decision tree for interpreting urinary 2-thiouracil (2-TU) findings in bovine and porcine samples using species-specific thresholds (10 µg/L for bovine; 30 µg/L for porcine). Samples with 2-TU below the threshold are classified as compliant, while samples at or above the threshold are evaluated for 4-thiouracil; detection of 4-thiouracil results in a compliant classification, whereas non-detection results in a non-compliant classification

3. A1c Steroids

For control purposes, matrices of choice are urine followed by liver; for 17β-oestradiol, testosterone it is serum, also for esters of oestrogens, androgens and progestagens it is serum. For gestagens such as MPA it is kidney fat. The matrices of choice are indicated in the table. The matrix hair can be used when controlling esters of oestradiol, testosterone, nortestosterone, boldenone and esters of other steroids. Muscle has been included for control purposes of import and (imported) aquaculture products. For A1c steroids, not all steroids are mentioned by name in this guidance paper. Generally, 0.5 µg/kg for the marker of the steroid in urine is an acceptable MMPR.
Strategies for the enforcement of natural hormones can be found in EURL Reflection paper 2.0.[4]
The table below lists steroids for which analysis is minimum required or recommended. For all other steroids, an MMPR value of 1.0 µg/kg in urine, 2.0 µg/kg (muscle, liver) or 10.0 µg/kg in hair applies.

[4] https://eurl-residues.eu/wp-content/uploads/2023/02/EURL_WFSR_Reflection_paper_2_0_Final_Plaintext_20230207.pdf

Substances	Marker residue-metabolite##	Matrix	MMPR
Boldenone#	**17β-boldenone-glucuronide** (young bovine, <6 months)	**Urine**	1.0 µg/kg
	17β-boldenone	**Liver** Muscle	2.0 µg/kg 2.0 µg/kg
	17β-boldenone in porcine	**Urine** **Liver** Muscle	1.0 µg/kg 2.0 µg/kg 2.0 µg/kg
	17α-boldenone (bovine, sheep, goat, horse)	**Urine** **Liver** Muscle	1.0 µg/kg 2.0 µg/kg 2.0 µg/kg
Boldenone	Boldenone-esters	Serum/plasma hair	1.0 µg/kg 10.0 µg/kg
17β-19-Nortestosterone## (nandrolone)	**17α-19-Nortestosterone###** (epi-nandrolone) Bovine **17β-19-Nortestosterone##** (nandrolone) Porcine	**Urine** **Liver** Muscle	0.5 µg/kg 2.0 µg/kg 1.0 µg/kg
17β-19-Nortestosterone## (nandrolone)	Nandrolone-esters	Serum/plasma Hair	1.0 µg/kg 10.0 µg/kg
Ethinylestradiol		**Urine** **Liver** Muscle	0.5 µg/kg 2.0 µg/kg 1.0 µg/kg
17β-Oestradiol	17β-oestradiol	Serum/plasma Liver Muscle	0.1 µg/kg 2.0 µg/kg 0.1 µg/kg *
17β-Oestradiol	17β-oestradiol-esters	Hair Serum/plasma	10.0 µg/kg 0.1 µg/kg
17β-Testosterone	17β-testosterone	Serum	Male < 6 months: 10.0 µg/kg Male 6 - 18 months: 30.0 µg/kg Female < 18 months: 0.5 µg/kg
17β-testosterone	17β-testosterone ester	Hair	10.0 µg/kg
		Serum	1.0 µg/kg
Methyltestosterone		**Urine** **Liver** Muscle	2.0 µg/kg 2.0 µg/kg 1.0 µg/kg

Methylboldenone		**Urine** **Liver** Muscle	2.0 µg/kg 2.0 µg/kg 1.0 µg/kg
Chlorotestosterone	**17α-clostebol and chlorandrostenedione (CLAD)**	**Urine** **Liver** Muscle	0.5 µg/kg 2.0 µg/kg 1.0 µg/kg
17β-trenbolone	**17α-trenbolone (urine)** **17β-trenbolone (muscle)** **17α- and 17β-trenbolone (liver)** **Trenbolone esters (hair)**	**Urine** **Liver** Muscle	0.5 µg/kg 2.0 µg/kg 1.0 µg/kg
		Hair	10.0 µg/kg
Stanozolol	**16β-hydroxystanozolol (urine)**	**Urine**	0.5 µg/kg
	Stanozolol (liver, muscle and hair)	Liver, Muscle Hair	2.0 µg/kg 1.0 µg/kg 10.0 µg/kg
Megestrol	Megestrol (acetate)	**Kidney fat** Muscle	2.0 µg/kg 1.0 µg/kg
Melengestrol	Melengestrol (acetate)	**Kidney fat** Muscle	2.0 µg/kg 1.0 µg/kg
Chlormadinone	Chlormadinone (acetate)	**Kidney fat** Muscle	2.0 µg/kg 1.0 µg/kg
Medroxy-progesterone	Medroxy-progesterone (acetate)	**Kidney fat** Muscle	2.0 µg/kg 1.0 µg/kg
All other steroids		**Urine**	1.0 µg/kg
		Liver, muscle (including fish),	2.0 µg/kg
		hair	10.0 µg/kg

**An MMPR of 0.1 µg/kg of 17-β-oestradiol in muscle meat is necessary to effectively enforce possible illegal administration of 17-β-oestradiol and is achievable by using a specific dedicated method.*
The MMPR of 0.1 µg/kg of 17-β-oestradiol in muscle meat is currently not achievable by using a multimethod, and competent authorities should be aware that using a method with a higher MMPR (i.e. 1 µg/kg) is probably not effective to enforce possible illegal administration of 17-β-oestradiol.

#Boldenone as described in the expert group paper of 2003, reference: Presence and metabolism of the anabolic steroid boldenone in various animal species (A review. July 2004, Food Additives and Contaminants 21(6):515-25). SANCO 2005 (D)430638.
##Porcine animals do not metabolise into α-isomers. For porcine animals, the administered steroid is the marker. 17β-19-nortestosterone occurs naturally in non-castrated pigs and horses. For the latest strategies, consult EURL Reflection Paper.
###17α-19-nortestosterone occurs naturally in pregnant cows and newborn calves. For the latest strategies, consult EURL Reflection Paper: https://www.wur.nl/en/Research-Results/Research-Institutes/food-safety-research/Reference-laboratory/European-Union-Reference-Laboratory/EURL-growth-promoters/Library-EURL-GP.htm

4. A1d Resorcylic acid lactones including zeranol

For the purpose of control matrices of choice are urine followed by liver. Muscle has been included for control purposes of imports and for (imported) aquaculture products.
The table below lists Resorcylic acid lactones for which analysis is minimum required or recommended. For all other resorcylic acid lactones, a default MMPR value of 2.0 µg/kg in urine and liver and 5.0 µg/kg in muscle applies.

Substances	**Marker residue-metabolite**	**Matrix**	**MMPR**
Zeranol[#]	**Taleranol**	**Urine** **Liver** Muscle	1.0 µg/kg 2.0 µg/kg 1.0 µg/kg
Zearalenone		**Urine** **Liver** Muscle	2.0 µg/kg 2.0 µg/kg 5.0 µg/kg
α-zearalenol		**Urine** **Liver** Muscle	2.0 µg/kg 2.0 µg/kg 5.0 µg/kg
β-zearalenol		**Urine** **Liver** Muscle	2.0 µg/kg 2.0 µg/kg 5.0 µg/kg
Zearalanone		**Urine** **Liver** Muscle	2.0 µg/kg 2.0 µg/kg 5.0 µg/kg
All other Resorcylic Acid Lactnes		**Urine** **Liver** Muscle	2.0 µg/kg 2.0 µg/kg 5.0 µg/kg

[#]*In case both zeranol and zearalenone are present, the presence of zeranol is considered as the result of mycotoxin contamination. Screening can be done on zeranol and its marker metabolite taleranol. When one of these compounds is detected a full resorcylic acid lactone (RAL) profile is needed to decide on noncompliance. For the latest strategies, consult EURL Reflection Paper 2.0.*

5. A1e Beta-agonists

For control purposes, the matrices of choice are urine, liver, lung, and especially retina, since higher concentrations of residues can be found for a longer time period. The analysis of complete eyes is the second choice compared to the retina, which is the first choice. Hair is also a recommendable matrix however, the risk of external contamination has to be considered. When taking hair, it is always recommended to sample also urine at the same time from the same animal. Muscle has been included for control purposes of imports, but concentrations in muscle are significantly lower than in previously mentioned matrices.

The table below lists beta-agonists for which analysis is minimum required or recommended. For all other beta-agonists, a MMPR value of 1.0 µg/kg or 5.0 µg/kg (retina, hair) applies.

Substances	**Matrix**	**MMPR**
Clenbuterol*: *MRL (for bovine and equidae:* *0.1 µg/kg in muscle* *0.05 µg/kg in milk (only bovine)* *0.5 µg/kg in liver and kidney*	**Urine, liver,** lung, muscle, kidney, feces, plasma, drinking water	0.1 µg/kg
	Retina, **hair** (Screening)	1.0 µg/kg
Brombuterol, Bromchlorbuterol Cimaterol Cimbuterol Clenpenterol Clenproperol Hydroxymethylclenbuterol Mabuterol Mapenterol Tulobuterol	**Urine, liver,** lung, muscle, kidney, feces, plasma, drinking water	0.1 µg/kg
	Retina, **hair** (Screening)	1.0 µg/kg
Clencyclohexerol **Isoxsuprine*** **Ractopamine** Ritodrin **Salbutamol** Salmeterol Terbutaline **Zilpaterol**	**Urine, liver,** lung, muscle, kidney, feces, plasma, drinking water	0.5 µg/kg
	Retina, **hair** (Screening)	5.0 µg/kg
All other beta-agonists	**Urine, liver,** lung, muscle, kidney, feces, plasma, drinking water	1.0 µg/kg
	Retina, **hair** (Screening)	5.0 µg/kg

** In accordance with Council Directive 96/22/EC, individual beta-agonists are permitted for very exceptional and restrictive therapeutic treatments.*

6. A2a Chloramphenicol

Substances	**Marker residue-metabolite**	**Matrix**	**MMPR**
Chloramphenicol		**Muscle, milk, egg, aquaculture products, honey, urine**	0.15 µg/kg (RPA)
		Gut matrix /casings	0.15 µg/kg (RPA)

7. A2b Nitrofurans

The table below lists nitrofurans for which analysis is minimum required or recommended. For all other nitrofurans, a RPA value of 0.5 µg/kg applies as well for all matrices.

Substances	**Marker residue-metabolite**	**Matrix**	**MMPR**
Furazolidone, Furaltadone, Nitrofurantoin, Nitrofurazone, Nifursol	**Metabolites AMOZ, AHD, SEM, AOZ, DNSH and/or parent compounds**	**Aquaculture products, muscle, milk, egg, honey**	0.5 µg/kg (RPA)
		Gut matrix /casings	0.5 µg/kg (RPA)
All other nitrofurans	Metabolites and/or parent compounds	Aquaculture products, muscle, milk, egg	0.5 µg/kg (RPA)
		Gut matrix /casings	0.5 µg/kg (RPA)

8. A2c Nitroimidazoles

For nitroimidazoles, the matrices of choice are egg, plasma/serum and retina, followed by – depending on the species – muscle. Then milk can also be chosen if relevant. For aquaculture products (including crustacean and fish egg) muscle is the relevant matrix – if applicable.
For all other nitroimidazoles an MMPR value of 1.0 µg/kg applies for all matrices.

Substances	Marker residue-metabolite	Matrix	MMPR
Ronidazole **Dimetridazole** **Metronidazole**	**Parent drugs** **+** **Hydroxy-metabolites**	**Poultry:** **Plasma**, serum, retina**, **egg** (muscle) **Pigs (and other species):** **Plasma**, serum, **muscle**, retina** **Aquaculture products,** milk, **honey** (Drinking water)	1.0 µg/kg
		Gut matrix /casings	1.0 µg/kg
All other Nitroimidazoles:	Parent drugs + Hydroxy-metabolites	**Poultry:** **Plasma**, serum, retina**, **egg** (muscle) **Pigs (and other species):** **Plasma**, serum, **muscle**, retina** **Aquaculture products,** milk, **honey** (Drinking water)	1.0 µg/kg
		Gut matrix /casings	1.0 µg/kg

***For retina, it is not possible yet to give a recommended concentration since it is not defined so far to which part of the eye (or the whole eye) the concentration should refer.*

9. A2d Other Substances

Substances	Marker residue-metabolite	Matrix	MMPR
Dapsone		Muscle, milk	5.0 µg/kg
Chlorpromazine		**Kidney**	5.0 µg/kg

10. A3a Pharmacologically Active Dyes

The table below lists pharmacologically active dyes for which analysis is minimum required or recommended. For all other A3a substances a default MMPR value of 0.5 µg/kg applies in fish muscle tissues.

Substances	Marker residues	Matrix	MMPR
Malachite green	**Malachite green and Leucomalachite green**	**Muscle fish**	Sum: 0.5 µg/kg (RPA)
Crystal violet *(Gentian violet)*	**Crystal violet and Leucocrystal violet *(Leucogentian violet)***	**Muscle fish**	Sum: 0.5 µg/kg
Brilliant green	**Brilliant green and Leucobrilliant green**	**Muscle fish**	Sum: 0.5 µg/kg
All other A3a substances	Mother cpds and/or metabolites	Muscle fish	Sum : 0.5 µg/kg

11. A3b Pesticides and Biocides

The table below lists certain A3b substances for which analysis is minimum required or recommended. Regulation (EC) No 396/2005 defines MRLs for all pesticides or a default MRL of 10 µg/kg if no MRL was set for a food product (Article 18). This group of substances therefore represents a special case. Although these are non-approved veterinary substances, there is a pesticide maximum residue limit that must be taken into account in enforcement measures and must be checked individually in each case. Consequently, no “MMPR” can be specified here within the meaning of the above definition.

Substances	Marker residues / residue definition	Matrix	“Pesticide MRL”
Fipronil	**Sum fipronil + sulfone metabolite (MB46136) expressed as fipronil)**	Milk, egg, muscle	5.0 µg/kg
Clothianidin	Clothianidin	Milk, egg, muscle	10.0 - 20.0 µg/kg
Thiamethoxam	Thiamethoxam	Milk, egg, muscle	10.0 – 50.0 µg/kg
All other A3b substances		Milk, egg, muscle	10.0 µg/kg

12. A3c Antimicrobials

The table below lists certain unauthorized antimicrobials (non-regulated under Reg 37/2010) for which analysis is minimum required or recommended. This list is not conclusive. For all other A3c antimicrobials a default MMPR value of 10.0 µg/kg if analytically achievable applies in muscle tissues and in milk.

Substances	Marker residues	Matrix	MMPR
Carbadox	QCA (quinoxaline-2-carboxylic acid) and/or DCBX (Desoxycarbadox)	Muscle, liver, feed	5.0 µg/kg
Olaquindox	MQCA (3-methylquinoxaline-2-carboxylic acid)	Muscle, liver, feed	5.0 µg/kg
All other Quinoxalines	Mother cpds and/or metabolites	Muscle, liver, feed	5.0 µg/kg
Nalidixic acid	Nalidixic acid	Muscle, Milk	10.0 µg/kg 50.0 µg/kg
Norfloxacin	Norfloxacin	Muscle, Milk	50.0 µg/kg 10.0 µg/kg
Sulbactam	Sulbactam	Muscle, Milk	10.0 µg/kg 10.0 µg/kg
Ormethoprim	Ormethoprim	Muscle, Milk	10.0 µg/kg 10.0 µg/kg
Clindamycin	Clindamycin	Muscle, Milk	10.0 µg/kg 10.0 µg/kg
Oleandomycin	Oleandomycin	Muscle, Milk	10.0 µg/kg 10.0 µg/kg
Fleroxacin	Fleroxacin	Muscle, Milk	10.0 µg/kg 10.0 µg/kg
Orbifloxacin	Orbifloxacin	Muscle, Milk	10.0 µg/kg 10.0 µg/kg

13. A3d Coccidiostats, histomonostats and other antiparasitic agents

For coccidiostats the matrices of choice are muscle, egg and liver.

The table below lists coccidiostats and other antiparasitic agents for which analysis is minimum required or recommended. For all other A3d substances, an MMPR value of 10.0 µg/kg applies.

Substances	Marker residues	Matrix	MMPR
Clopidol Nequinate Arprinocid Diaveridine Buquinolate Ethopabate Simetone		Muscle, egg, liver	5.0 µg/kg
Dinitolimide Nitromide		Muscle, egg, liver	15.0 µg/kg
All other A3d substances		Muscle, egg, liver	10.0 µg/kg

14. A3e Protein and peptide hormones

At the moment CDR (EU) 2022/1644 does not state a mandatory testing for this group. However, it can be part of the NRCPs.

Substances	Marker residue-metabolite	Matrix	MMPR
Recombinant Bovine Somatotropine		Blood serum Milk	20.0 µg/kg 10.0 µg/kg
Growth Hormone Releasing Peptides (GHRPs)	GHRP-1 GHRP-2 GHRP-4 GHRP-6 Hexareline Ipamorelin	Urine	10.0 µg/kg
All other prohibited peptide hormones		Urine	20.0 µg/kg

15. A3f Sedatives and corticosteroids and other pharmacological active substances such as selective androgen receptor modulators (SARMs) and benzodiazepines

Matrix of choice for sedatives is kidney. There are currently authorised sedatives in Table 1 of CR 37/2010, namely Azaperon and Xylazine.
Matrix of choice for corticosteroids is urine and liver. For all other A3f substances (sedatives and corticosteroids), an MMPR value of 10.0 µg/kg applies.
Matrix of choice for SARMs is urine. Muscle and hair can also be analysed. For all other A3f substances (SARMs), an MMPR value of 5.0 µg/kg in urine and 10 µg/kg applies in muscle and hair.

Substances	**Marker residue metabolite**	**Matrix**	**MMPR**
Acepromazine **Propiopromazine** **Haloperidol**		Kidney Muscle	5.0 µg/kg 10.0 µg/kg
All other sedatives		Kidney Muscle	10.0 µg/kg 10.0 µg/kg
Dexamethasone		Urine	0.5 µg/kg
		Liver, muscle	MRL when there has been authorised treatment
Flumethasone **Triamcinolone-actonide** **Clobetasol** **Isoflupredone**		Urine Liver Muscle	1.0 µg/kg 5.0 µg/kg 10.0 µg/kg
All other corticosteroids		Urine Liver Muscle	10.0 µg/kg 10.0 µg/kg 10.0 µg/kg
Andarine **Ostarine** **Bicalutamide**		Urine Muscle Hair	1.0 µg/kg 10.0 µg/kg 10.0 µg/kg

Substances	**Marker residue metabolite**	**Matrix**	**MMPR**
Other SARMs such as and all others: S23, AC-262536, ACP-105, Pf-06260414, BMS-564929, ligandrol, LGD-4033, RAD140, Ly2452473, GLPG0492, LGD-2226, testolone, Yk-11, stenabolic, cardarine, ibutamoren, Cl-4AS-1, Mk-0773, SK33		Urine Muscle Hair	5.0 µg/kg 10.0 µg/kg 10.0 µg/kg
Benzodiazepines: **Diazepam** **Oxazepam** **Triazolam** **Alprazolam** Brotizolam, clonazepam, flunitrazepam, lorazepam, midazolam, temazepam, 7-aminoclonazepam 7-aminonitrazepam, desalkylflurazepam, n-desmethylflunitrazepam, α-hydroxymidazolam, 2-hydroxyethylflurazepam	Desmethyldiazepam (nordazepam) α-hydroxytriazolam α-hydroxy-alprazolam 7-aminoflunitrazepam	Urine Muscle	5.0 µg/kg 10.0 µg/kg
All other benzodiazepines		Urine Muscle	5.0 µg/kg 10.0 µg/kg

16. A3f Non-steroidal anti-inflammatory drugs NSAIDs

For control purposes matrices of choice are muscle and milk, followed by kidney, liver, plasma and egg. The table below lists NSAIDs for which analysis is minimum required or recommended. For all other NSAIDs, an MMPR value of 20.0 µg/kg applies.

Substances	Matrix	MMPR
Phenylbutazone **Oxyphenbutazone**	**Muscle, milk,** kidney, liver, plasma, egg	5.0 µg/kg
Naproxen Mefenamic acid Niflumic acid Flufenamic acid		10.0 µg/kg
Ibuprofen		20.0 µg/kg
All other NSAIDs	**Muscle, milk** kidney, liver, plasma, egg	20.0 µg/kg

17. A3g Antiviral substances

At the moment CDR (EU) 2022/1644 does not prescribe a mandatory testing for this group. However, it can be part of the NRCPs. In CIR (EU) 2022/1255 designating antimicrobials or groups of antimicrobials reserved for treatment of certain infections in humans, in accordance with Regulation (EU) 2019/6 of the European Parliament and of the Council in Annex (2) a list of antiviral substances is given. These can be considered high priority antiviral substances to be controlled. For all other antiviral substances, an MMPR value of 10.0 µg/kg applies.

Substance	Matrix	MMPR
Substances from CIR (EU) 2022/1255	Muscle Liver	5.0 µg/kg 5.0 µg/kg
Arbidol Acyclovir Memantine Imiquimod Penciclovir Ganciclovir Moroxydine	Muscle Liver	5.0 µg/kg 5.0 µg/kg
All other antivirals	Muscle Liver	10.0 µg/kg 10.0 µg/kg

18. B1a Antimicrobials - Honey

The table below lists certain antimicrobials for which analysis is minimum required or recommended in honey. This list is not conclusive. For all other B-substances not listed in 37/2010 for Honey a default non-cascade MMPR value of the ¼ of the cascade MRL value applies (see first paragraph of this guidance).

Group	Substances to be included	MMPR
Bla**	Tetracyclines	25.0 µg/kg
	Sulfonamides	25.0 µg/kg
	Streptomycin	50.0 µg/kg
	Macrolides: . Erythromycin . Tylosin	 10.0 µg/kg 12.5 µg/kg

*** MMPRs for B-substances in honey are related to control in the absence of a signified cascade use in line with Regulation (EU) 2018/470.*