

Supplementary Material

1 Literature Review Strategy

1.1 Timeline and scientific databases

The search was executed on January 20, 2020 and included literature from January 1, 2016 to present to update a recent review on AMU for general animal surveillance published by Werner, et al., 2018. Communication with the authors indicated that their search was completed in early 2015. The search included five scientific databases:

1. Medline® via Ovid® provides literature (from 1946 – present). It is the world’s leading bibliographic source for biomedical scholarly literature and research.
2. CAB Abstracts® via Web of Science™ covers multi-disciplinary literature (from 1910 - present) in the fields of nature, health, and social sciences. CAB Abstracts is the leading English-language bibliographic information service providing access to the world’s applied life sciences literature.
3. Embase via Ovid® covers a vast range of biomedical sciences journals, with an added focus on European studies (from 1974 – present) not present in MEDLINE®.
4. AGRICOLA™ via ProQuest® sources from the United States National Agricultural Library to retrieve global literature (from 1970 – present) on the topic of agriculture.
5. BIOSIS Previews via Web of Science™ covers pre-clinical and experimental research, methods and instrumentation, animal studies, and more (1926 - present).

1.2 Search strategies and results

Medline® via Ovid®

Component	Search Terms	# Results
1. Surveillance	(surveillance* or inspect* or control* or metric* or measure* or observ* or scrutin* or examin* or monitor* or track* or evaluat*).ti,ab,kw. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	10320274
2. Use	("Use*" or Usage* or Treat* or Appli* or Prescribe* or admin* or distribut* or sell* or sale* or metric or metrics or distribut*).ti,ab,kw. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary	12242908

	concept word, rare disease supplementary concept word, unique identifier, synonyms]	
3. Antimicrobial	(antibiotic* or antimicrobial* or anti-microbial* or anti-biotic* or anti-bacterial* or antibacterial* OR multidrug or medication* or drug* or antiinfective or anti-infective or anti-infective agent*).ti,ab,kw. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	2230687
4. Metric	(PDD or prescribed daily dose or ACD or animal course dose or DCD or defined course dose or DCDA or defined course dose animal or ADDD or animal defined daily dose or DDDA or defined daily dose animal or DDD or UDD or UCD or PCU or daily defined dose or daily course dose or population correct* unit or used daily dose or APCU or adjusted population correct* unit or DOT or DPD or Daily Product Dose or treatment incidence or Treatment frequency or treatment incidence rate or treatment frequency or sale* data or product related daily dose or animal daily dose).ti,ab,kw.	55775
5. Animal	(Cattle or cow or bull or bulls or steer or calf or calves or bos taurus or beef or veal or pig or piglet or swine or hog or sow or pork or sus scrofa domesticus or chick or chicken or chickens or rooster or hen or broiler or gallus gallus domesticus or turkeys or meleagris gallopavo or turkey or grouse or poultr*) or ((farm* or domestic or aquaculture or livestock) and (fish* or finfish or fin-fish or atlantic salmon or pacific salmon or arctic char or black cod or chinook salmon or coho or tilapia)).ti,ab,kw.	956412
6. 1 AND 2 AND 3 AND 4 AND 5		129

7. limit 6 to yr="2016 - Current"		60
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Embase® via Ovid®

Component	Search Terms	# Results
1. Surveillance	(surveillance* or inspect* or control* or metric* or measure* or observ* or scrutin* or examin* or monitor* or track* or evaluat*).ti,ab,kw. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	13233562
2. Use	("Use*" or Usage* or Treat* or Appli* or Prescribe* or admin* or distribut* or sell* or sale* or metric or metrics or distribut*).ti,ab,kw. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	15503048
3. Antimicrobial	(antibiotic* or antimicrobial* or anti-microbial* or anti-biotic* or anti-bacterial* or antibacterial* or multidrug or medication* or drug* or antiinfective or anti-infective or anti-infective agent*).ti,ab,kw. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	3101711
4. Metric	(PDD or prescribed daily dose or ACD or animal course dose or DCD or defined course dose or DCDA or defined course dose animal or ADDD or animal defined daily dose or DDDA or defined daily dose animal or DDD or UDD or UCD or PCU or daily defined dose or daily course dose or population correct* unit or used daily dose or APCU or adjusted population correct* unit or DOT or DPD or Daily	72770

	Product Dose or treatment incidence or Treatment frequency or treatment incidence rate or treatment frequency or sale* data or product related daily dose or animal daily dose).ti,ab,kw.	
5. Animal	(Cattle or cow or bull or bulls or steer or calf or calves or bos taurus or beef or veal or pig or piglet or swine or hog or sow or pork or sus scrofa domesticus or chick or chicken or chickens or rooster or hen or broiler or gallus gallus domesticus or turkeys or meleagris gallopavo or turkey or gobbler or poultr*) or ((farm* or domestic or aquaculture or livestock) and (fish* or finfish or fin-fish or atlantic salmon or pacific salmon or arctic char or black cod or chinook salmon or coho or tilapia)).ti,ab,kw.	897833
6. 1 AND 2 AND 3 AND 4 AND 5		148
7. limit 6 to yr="2016 - Current		62

AGRICOLA™ via ProQuest

Component	Search Terms	# Results
1. Surveillance	noft(surveillance* or inspect* or control* or metric* or measure* or observ* or scrutin* or examin* or monitor* or track* or evaluat*)	1555184
2. Use	noft("Use*" or Usage* or Treat* or Appli* or Prescribe* or admin* or distribut* or sell* or sale* or metric or metrics or distribut*)	2184459
3. Antimicrobial	noft(antibiotic* or antimicrobial* or anti-microbial* or anti-biotic* or anti-bacterial* or antibacterial* or multidrug or	262309

	medication* or drug* or antiinfective or anti-infective or anti-infective agent*)	
4. Metric	noft(PDD or prescribed daily dose or ACD or animal course dose or DCD or defined course dose or DCDA or defined course dose animal or ADDD or animal defined daily dose or DDDA or defined daily dose animal or DDD or UDD or UCD or PCU or daily defined dose or daily course dose or population correct* unit or used daily dose or APCU or adjusted population correct* unit or DOT or DPD or Daily Product Dose or treatment incidence or Treatment frequency or treatment incidence rate or treatment frequency or sale* data or product related daily dose or animal daily dose)	47031
5. Animal	noft(Cattle or cow or bull or bulls or steer or calf or calves or bos taurus or beef or veal or pig or piglet or swine or hog or sow or pork or sus scrofa domesticus or chick or chicken or chickens or rooster or hen or broiler or gallus gallus domesticus or turkeys or meleagris gallopavo or turkey or gobbler or poultr*) or ((farm* or domestic or aquaculture or livestock) and (fish* or finfish or fin-fish or atlantic salmon or pacific salmon or arctic char or black cod or chinook salmon or coho or tilapia))	668750
6. 1 AND 2 AND 3 AND 4 AND 5		914
7. Filter 2016- 01-01 – 2020- 01-01		198

CAB Abstracts® via Web of Science™

Component	Search Terms	# Results
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1. Surveillance	Topic: ((surveillance* or inspect* or control* or metric* or measure* or observ* or scrutin* or examin* or monitor* or track* or evaluat*))	4962453
2. Use	Topic: (("Use*" or Usage* or Treat* or Appli* or Prescribe* or admin* or distribut* or sell* or sale* or metric or metrics or distribut*))	5715468
3. Antimicrobial	Topic: ((antibiotic* or antimicrobial* or anti-microbial* or anti-biotic* or anti-bacterial* or antibacterial* or multidrug or medication* or drug* or antiinfective or anti-infective or anti-infective agent*))	1587251
4. Metric	Topic: ((PDD or prescribed daily dose or ACD or animal course dose or DCD or defined course dose or DCDA or defined course dose animal or ADDD or animal defined daily dose or DDDA or defined daily dose animal or DDD or UDD or UCD or PCU or daily defined dose or daily course dose or population correct* unit or used daily dose or APCU or adjusted population correct* unit or DOT or DPD or Daily Product Dose or treatment incidence or Treatment frequency or treatment incidence rate or treatment frequency or sale* data or product related daily dose or animal daily dose))	163423
5. Animal	Topic: ((Cattle or cow or bull or bulls or steer or calf or calves or bos taurus or beef or veal or pig or piglet or swine or hog or sow or pork or sus scrofa domesticus or chick or chicken or chickens or rooster or hen or broiler or gallus gallus domesticus or turkeys or meleagris gallopavo or turkey or gobbler or poultr*) or ((farm* or domestic or aquaculture or livestock) and (fish* or finfish or fin-fish or atlantic salmon or pacific salmon or arctic char or black cod or chinook salmon or coho or tilapia)))	1774047
6. 1 AND 2 AND 3 AND 4 AND 5		7658

7. 6 limited to 2016-2020		1055
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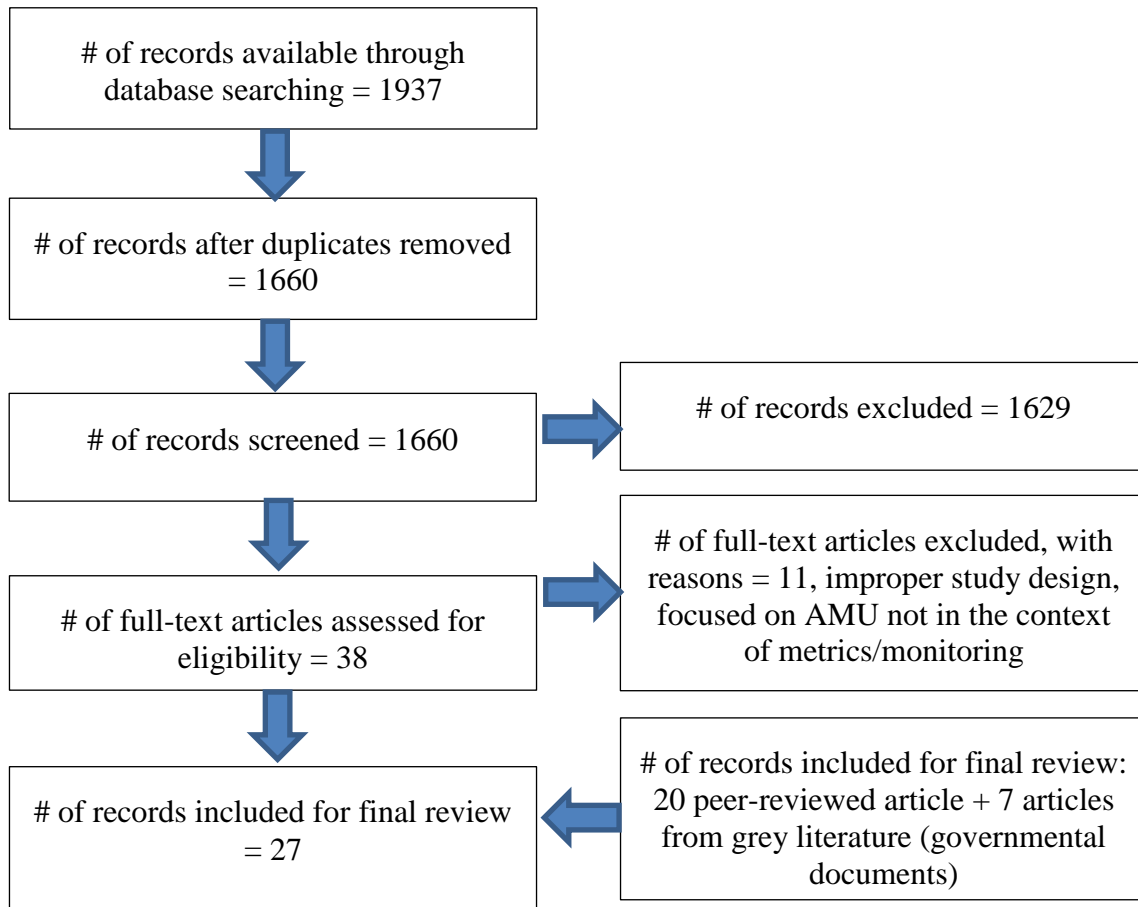
Biosis® via Web of Science™

Component	Search Terms	# Results
1. Surveillance	Topic: ((surveillance* or inspect* or control* or metric* or measure* or observ* or scrutin* or examin* or monitor* or track* or evaluat*))	10101482
2. Use	Topic: (("Use*" or Usage* or Treat* or Appli* or Prescribe* or admin* or distribut* or sell* or sale* or metric or metrics or distribut*))	12241802
3. Antimicrobial	Topic: ((antibiotic* or antimicrobial* or anti-microbial* or anti-biotic* or anti-bacterial* or antibacterial* or multidrug or medication* or drug* or antiinfective or anti-infective or anti-infective agent*))	5126564
4. Metric	Topic: ((PDD or prescribed daily dose or ACD or animal course dose or DCD or defined course dose or DCDA or defined course dose animal or ADDD or animal defined daily dose or DDDA or defined daily dose animal or DDD or UDD or UCD or PCU or daily defined dose or daily course dose or population correct* unit or used daily dose or APCU or adjusted population correct* unit or DOT or DPD or Daily Product Dose or treatment incidence or Treatment frequency or treatment incidence rate or treatment frequency or sale* data or product related daily dose or animal daily dose))	457235
5. Animal	Topic: ((Cattle or cow or bull or bulls or steer or calf or calves or bos taurus or beef or veal or pig or piglet or swine or hog or sow or pork or sus scrofa domesticus or chick or chicken or chickens or rooster or hen or broiler or gallus gallus domesticus or turkeys or meleagris gallopavo or turkey or gobbler or poultr*) or ((farm* or domestic or aquaculture or livestock) and (fish* or finfish or fin-fish or atlantic salmon or pacific salmon or arctic char or black cod or chinook salmon or coho or tilapia))	1391050

6. 1 AND 2 AND 3 AND 4 AND 5		3909
7. 6 limited to 2016-2020		562

2 Supplementary Figures and Tables

2.1 Supplementary Figures



Supplementary Figure 1. The compiled results from the search of five scientific databases and internet search engines, and screening of articles that included information about antimicrobial use surveillance metrics and indicators in animals (January 1, 2016 to January 20, 2020).

2.2 Supplementary Tables

Supplementary Table 1. Average treatment weights used to calculate Population Correction Units for various terrestrial animal species (adapted from the European Medicines Agency (2019) and Radke (2017)).

Animal Category	Average treatment weights	
	ESVAC weights (kg) ^{a,b}	Adjusted weights (kg) ^b
Pigs		
Suckling piglets	4	4
Weaner pigs	12	12
Sows/boars	240	240
Slaughter pigs	65 (25-105)*	65
Finisher	65	65
Imported/exported pigs for slaughter	65	65
Imported/exported pigs for fattening	25	-
Cattle		
Slaughter cows	500	627
Slaughter heifers	200	269 (45-493)*
Slaughter bullocks and bulls	500	329 (45-612)*
Slaughter calves and young cattle	140	169 (45-293)*
Imported/exported cattle for slaughter	500	299
Imported/exported cattle for fattening	140	169 (45-293)*
Livestock dairy cows	500	627
Veal calves	80	80
Poultry		
Slaughter broilers	1	1
Slaughter turkeys	6.5	6.5
Imported/exported broilers for slaughter	1	1
Finfish		
Slaughter fish	<i>Total slaughter weight (kg)</i>	

^a (European Medicines Agency, 2019)

^b (Radke, 2017)

* Weight used (weight range for category in brackets), where applicable.

Supplementary Table 2. Complete list of articles and their extracted data that were included in the final review.

See separate excel file titled “2021-01-21-SupplTable2-reviewedarticles-dataextraction.xlsx”.