Use of antimicrobials for animals in New Zealand, and in comparison with other countries

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Supplementary Table 1. Data sources and methods of calculation for antimicrobial use based on sales, animal and human populations, and weight classes.

The content of this supplementary information has not been edited. All risk and liability rest with the authors.

Animals			Humans		
Antimicrobials	Biomass	Calculation(s)	Antimicrobials	Biomass	Calculation(s)
26 European countries					
ESVAC publication ^a using data from wholesalers, pharmacies and clinics	ESVAC publication ^a using <u>Populations</u> : Government statistics and <u>Weights</u> : Montforts (1999) ^b	Values taken directly from ESVAC publication ^a which used the European Medicines Authority (EMA) method ^c	ECDC/EFSA/EMA publication ^d using data from wholesalers, pharmacies and clinics	ECDC/EFSA/EMA publication ^d	Values taken directly from ECDC/EFSA/EMA publication ^d which used the EMA method
Australia					
2009–2010 data from Australian Pesticides and Veterinary Medicines Authority ^e	<u>Populations</u> : Australian Bureau of Statistics, Agricultural Commodities ^f <u>Weights</u> : Department of Agriculture and industry levy-body databases ^{gh} , see Supp. Table 2	Made by authors using the EMA method and from Australia's first national antibiotic resistance strategy ⁱ	OECD Health statistics 2013 ^j	OECD Health statistics 2013 ^j	Author extrapolation from OECD ^j by comparison with ECDC/EFSA/EMA data for similar use rate
Canada					
Public Health Agency of Canada ^k , Canadian antimicrobial resistance surveillance system	<u>Populations</u> : Canadian agricultural census 2012 ^l <u>Weights</u> : Used US data, Land grant university web sites, see Supp. Table 2	Made by authors using the EMA method	Government of Canada Human antimicrobial use report ^m	<u>Population</u> : Statistics Canada ⁿ <u>Weights</u> : guidance data for health based calculations, EFSA ^o	Made by authors using the EMA method
New Zealand					
Ministry of Primary Industries, Agricultural Chemicals and Veterinary Medicines reports ^{pqr}	<u>Populations</u> : Statistics New Zealand, Agricultural tables - livestock numbers ^s ; horses S Cooper, Horse Racing Board pers. comm.; cats and dogs, New Zealand Companion Animal Council <u>Weights</u> : Industry levy-body web sites, publications and their veterinarians, See Supp. Table 2	Made by authors using the EMA method	Ministry of Health via Dr MG Thomas and Dr A Smith pers. comm.	<u>Population</u> : Statistics New Zealand, census ^t <u>Weights</u> : guidance data for health based calculations, EFSA ^o	Made by authors using the EMA method
USA					
Food and Drug Administration, Summary report on antimicrobials sold or distributed for use in food-producing animals ^u	<u>Populations</u> : US Department of Agriculture census ^v <u>Weights</u> : Land grant university web sites, see Supp. Table 2	Made by authors using the EMA method	Food and Drug Administration, Antibacterial drug use analysis ^w	<u>Population</u> : US census, 2012 ^x <u>Weights</u> : guidance data for health based calculations, EFSA ^o , US census ^x	Made by authors using the EMA method

^a **Anonymous.** *Sales of Veterinary Antimicrobial Agents in 26 EU/EEA Countries in 2012*

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^b **Montforts MHMM.** Environmental risk assessment for veterinary medicinal products. Part 1. Other than GMO-containing and immunological products. First update

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^c **Anonymous.** *Trends in the sales of veterinary antimicrobial agents in nine European countries (2005-2009)*

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- ^h **Shapiro S.** *Deer Industry Database* <https://rirdc.infoservices.com.au/downloads/09-175> (accessed 14 March 2016). Rural Industries Development Corporation, Barton ACT, Australia, 2010
- ⁱ **Anonymous.** *Responding to the Threat of Antimicrobial Resistance: Australia's First National Antimicrobial Resistance Strategy 2015–2019* [http://www.health.gov.au/internet/main/publishing.nsf/Content/1803C433C71415CACA257C8400121B1F/\\$File/amr-strategy-2015-2019.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/1803C433C71415CACA257C8400121B1F/$File/amr-strategy-2015-2019.pdf) (accessed 14 March 2016). Australian Government, Canberra, ACT, Australia, 2015
- ^j **Anonymous.** *Government at a Glance 2015* P 185 <http://dx.doi.org/10.1787/888933249573> (accessed 24 March 2016), OECD Publishing, Paris, France, 2015
- ^k **Anonymous.** *Canadian antimicrobial resistance surveillance system-report 2015* <http://healthycanadians.gc.ca/alt/pdf/publications/drugs-products-medicaments-produits/antibiotic-resistance-antibiotique/antimicrobial-surveillance-antimicrobioresistance-eng.pdf> (accessed 14 March 2016). Public Health Agency of Canada, Ottawa, Canada, 2015
- ^l **Anonymous.** *Statistics Canada 2012 Agricultural census* <http://www.statcan.gc.ca/pub/12-581-x/2012000/agri-eng.htm> (accessed 30 September 2015). Statistics Canada, Ottawa, Canada, 2015
- ^m **Anonymous.** *Human Antimicrobial Use Report, 2012/2013.* <http://www.phac-aspc.gc.ca/publicat/hamdur-rumamh/2012-2013/index-eng.php> (accessed 30 September 2015), Public Health Agency of Canada, Guelph, Canada, 2015
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- ^p **Anonymous.** Antibiotic Sales and Use Overview 2004-2009 www.foodsafety.govt.nz/elibrary/industry/antibiotic-sales-2004-2009.pdf (accessed 14 March 2016) Ministry of Agriculture and Forestry, Wellington, NZ, 2010
- ^q **Anonymous.** *Antibiotics Sales Analysis: 2009-2011, MPI Technical Paper No: 2013/62* <http://www.foodsafety.govt.nz/elibrary/industry/report-antibiotics-sales-2009-2011.pdf> (accessed 14 March 2016). Ministry for Primary Industries, Wellington, NZ, 2012

^r **Anonymous.** *Antibiotic Sales Analysis: 2011-2014*, Ministry for Primary Industries, Wellington, NZ, unpublished data

^s **Anonymous.** *Livestock Numbers by Regional Council* <http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7423> (accessed 9 September 2015), Statistics New Zealand, Wellington, New Zealand, 2015

^t **Anonymous.** *Subnational population estimates* <http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7502#> (accessed 9 September 2015), Statistics New Zealand, Wellington, New Zealand, 2015

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^v **Anonymous.** *2012 Census of Agriculture* http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_US/ (accessed 9 September 2015). United States Department of Agriculture, MD, USA, 2012

^w **Anonymous.** *Antibacterial Drug Use Analysis* www.fda.gov/downloads/drugs/drugsafety/informationbydrugclass/ucm319435.pdf (accessed 9 September 2015). US Food and Drug Administration, .MD, USA, 2012

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Supplementary Table 2. Data, and their sources, used to calculate population correction units (Biomass). See also data sources in Supplementary Table 1.

Species	Age/gender	Average weight (kg)	Comments	Data sources
New Zealand^a				
Beef cattle	0-1 year	225	Estimated 6 month weight over all breeds	Beef+Lamb New Zealand, C. Houston
	1-2 years	320	Estimated 18 month weight over all breeds	
	>2 years	500	Includes bulls for dairy, e.g. Jersey	
Dairy Cattle	0-1 year	136	Estimated 6 month weight over all breeds	DairyNZ, K. Macdonald
	1-2 years	331	Estimated 18 month weight over all breeds	
	>2 years	500	Takes account of proportion of herd of Jersey, Kiwi cross and Friesian	
Sheep	Hoggets	56		Beef+Lamb New Zealand, C. Houston
	Ewes + rams	63		
Deer	< 1 year	95		Dr A. Bell, deer veterinarian
	Mature	110		
Pigs	All young stages	51.3		NZPork, F. Clements
	Gilts	110		
	Sows and boars	231		

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Species	Age/ gender	Average weight (kg)	Comments	Data sources
New Zealand ^a				
Poultry	Layers	2.3	Same breeds and production system. Others include turkeys, ducks and geese	PIANZ and USA data
	Broilers	0.99		
	Other	1.97		
Goats	Does	59	Bucks too few and too similar to mature does to make a difference	Dr V McLean, Dairy Goat Cooperative
Horses	All	500	Estimate for a very wide range of horse types	Horse Racing Levy Board
Australia, Canada, USA ^b				
Beef Cattle	0-1 year	180	Estimated 6 month weight over all breeds	Statistics bodies, university extension services, broad literature search often of promotional material.
	1-2 years	480		
	>2 years	590		
Dairy Cattle	0-1 year	406	Estimated 6 month weight over all breeds	Statistics bodies, university extension services.
	1-2 years	300		
	>2 years	680		

Species	Age/ gender	Average weight (kg)	Comments	Data sources
Australia, Canada, USA^b				
Sheep	Hoggets	45		Statistics bodies, university extension services.
	Ewes + rams	60		
Deer/elk/bison	< 1 year	70		Dr A. Bell, deer veterinarian
	1-2 years	100		
	>2 years	120		
Pigs	All young stages	55		USDA statistics data
	Gilts	100		
	Sows and boars	180		
Poultry	Layers	2.3	Same breeds and production system. Others include ducks and geese	US National Chicken Council and USDA statistics data
	Broilers	0.99		
	Turkeys	3.6		
	Other	2		
Goats	Does	59	Bucks too few and too similar to mature does to make a difference	New Zealand estimate compared with Supp. Table 1 sources
Horses	All	500	Estimate for a very wide range of horse types	New Zealand estimate compared with Supp. Table 1 sources

^a These values reflect the more extensive systems common in New Zealand. The age ranges and animal types are used by Statistics New Zealand and/or the industry levy bodies.

^b These countries have broadly similar animal breeds and production systems. The age ranges and animal types are used by the national statistics organisations, or breed societies or university extension services.