Addressing AMR Challenges in Animal Health

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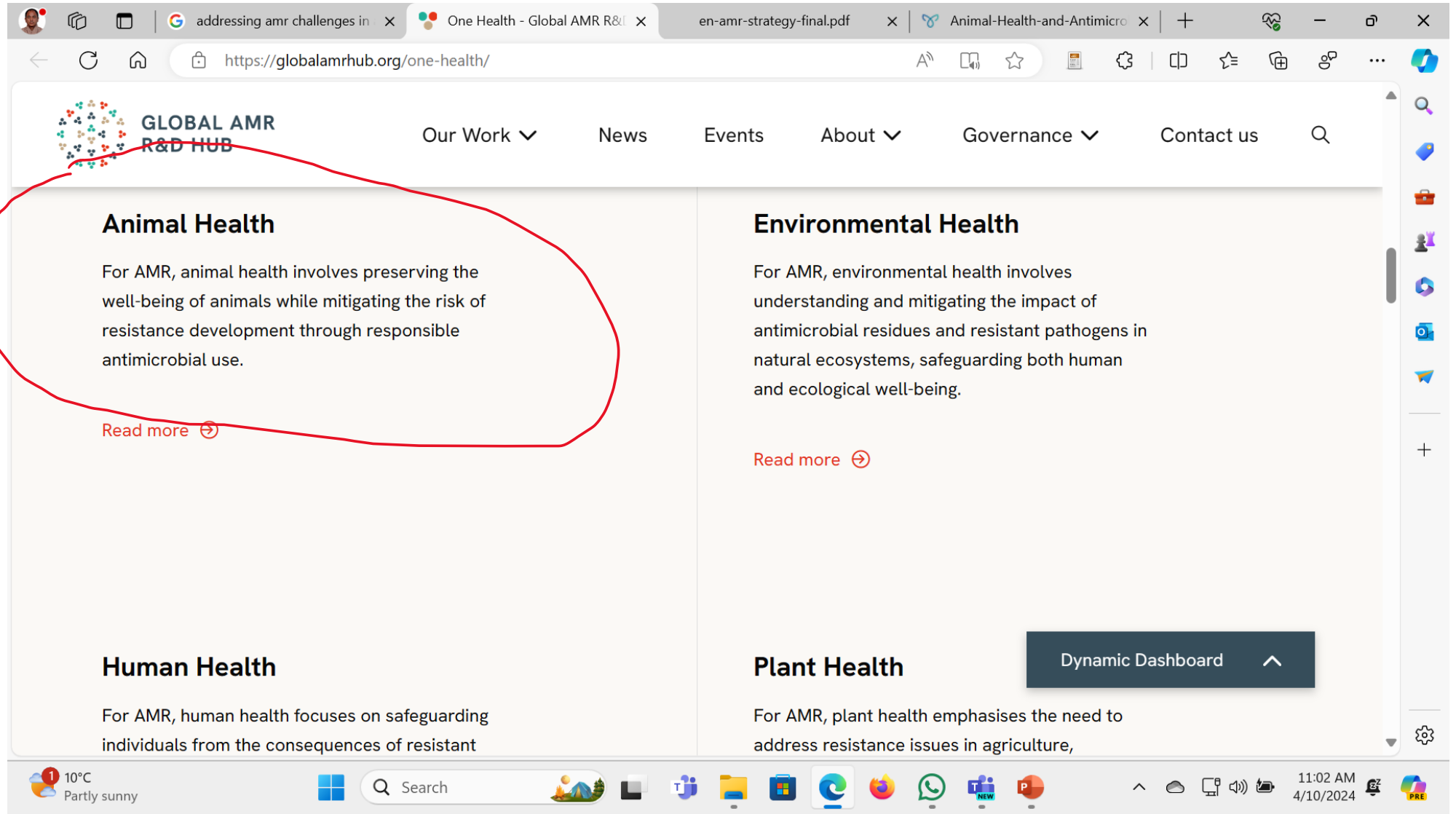
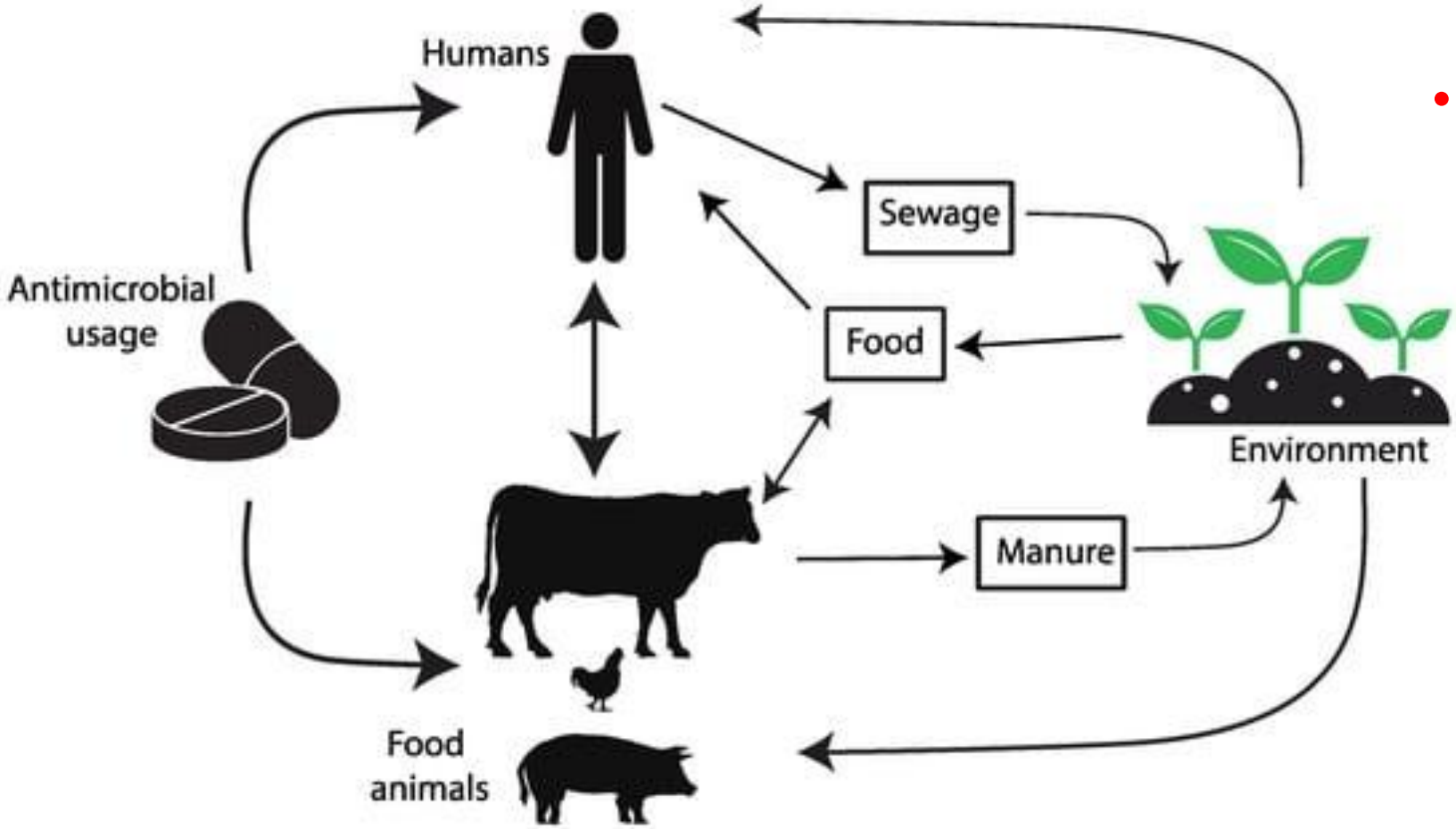
Overview

1. Role of Animal Health for AMR
2. Tackling AMR issue
3. Legislative Framework supporting AMR mitigation activities
4. Governance
5. Promotion of rational use of antimicrobials
6. Creating and promoting awareness on AMR
7. National and international collaboration
8. AMR Profile of zoonotic bacteria
9. AMR surveillance in healthy Poultry 2022-23- Supported by Fleming Fund
10. Antimicrobial consumption in livestock sector(2017-2021)
11. KAP survey on antibiotic use & AMR
12. Antibiotic prescriptions in veterinary consultations
13. Way forward

1. Role of Animal Health for AMR



2. Tackling AMR issue : Need for one health approach

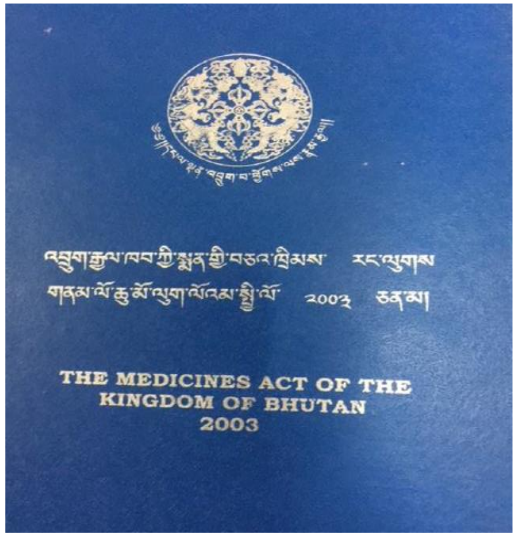


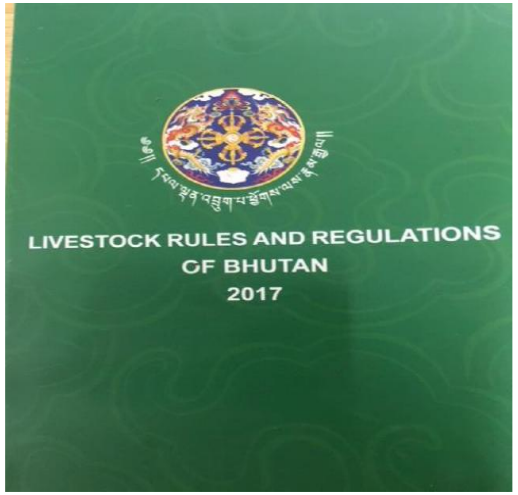
- Pathways of transmission for antimicrobial resistance between farm animals, the surrounding environment, and human populations

- Cella et al, *Pathogens* **2023**, *12*, 1074

3. Legislative Framework supporting AMR mitigation activities

- Medicine Act of Kingdom of Bhutan 2001
- Bhutan Medicine Rules & Regulations –2019
- Livestock Act of Bhutan 2001
- Livestock Rules and Regulations 2022
- Food Act of Bhutan 2005
- Food Rules & Regulations 2017

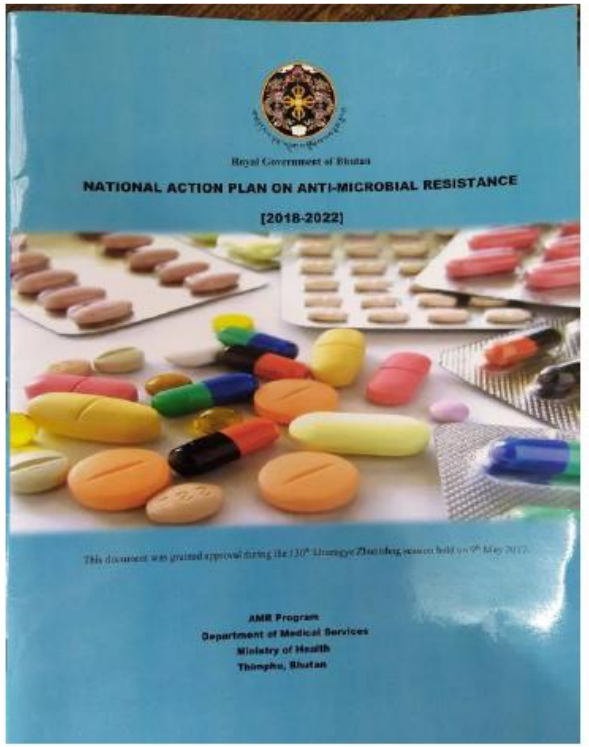




*** Bhutan Food & Drug Authority (BFDA) regulates & monitors the use of antimicrobials and drugs in both humans and animals (Antimicrobials classified as prescription only drugs).**

4. Governance

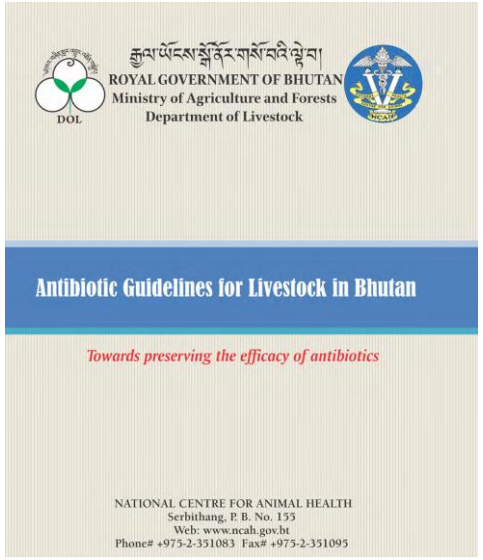
- Ministry of Health is the lead agency for AMR activities
- Focal agency - (NCAH, DoL) for MoAL-to coordinate the AMR activities in animal health
- National Action Plan for AMR (2018-2022), NAP prioritized and costed-Joint (MoH & MoAL)
- Bhutan One Health Strategic Plan (2017 to 2022)
- Representation at IMCOH from the ministry
- Representation in the Bhutan Medicine Board
- Representation in National Antimicrobial Technical Committee (NATC)
- Representation in Technical working group(TWG)

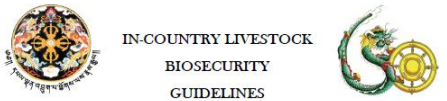


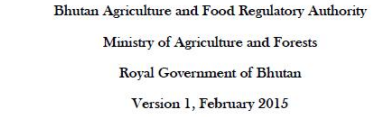
5. Promotion of rational use of antimicrobials

1. Guidelines

- Antibiotic guidelines for livestock 2016 (restriction on use of antimicrobials in animal feeds, withdrawal period)
- Standard treatment guidelines
- National Veterinary drug formulary (NVDF)2019
- In-country Livestock biosecurity guidelines 2015
- Infection prevention control (IPC) guidelines for Veterinary Hospitals (draft)







2. **Druk med Offline mobile App**: for NVDF & Antibiotic use guideline in Animals

6. Creating and promoting awareness on AMR

- Participation during World antimicrobial awareness week (WAAW) annually - one health advocacy meets
- Participation in BBS panel discussion
- All the animal health facilities observe WAAW annually (November).

7. National and international collaboration

- Technical working group(TWG) meetings conducted with in the Department (DoL) and between ministries (JDWNRH, BFDA, RCDC).
- Chulalongkorn University, Thailand, AMR reference centre for AMR in Asia pacific region-Participation in EQA.
- Peter Doherty Institute, Australia (Host institute for AMR Fleming Fund Fellows).

The Bhutan fellows at the Bhutan Country Grant launch, with the UK High Commissioner to India and the Minister of Health, Royal Government of Bhutan.

8. AMR Profile of zoonotic bacteria

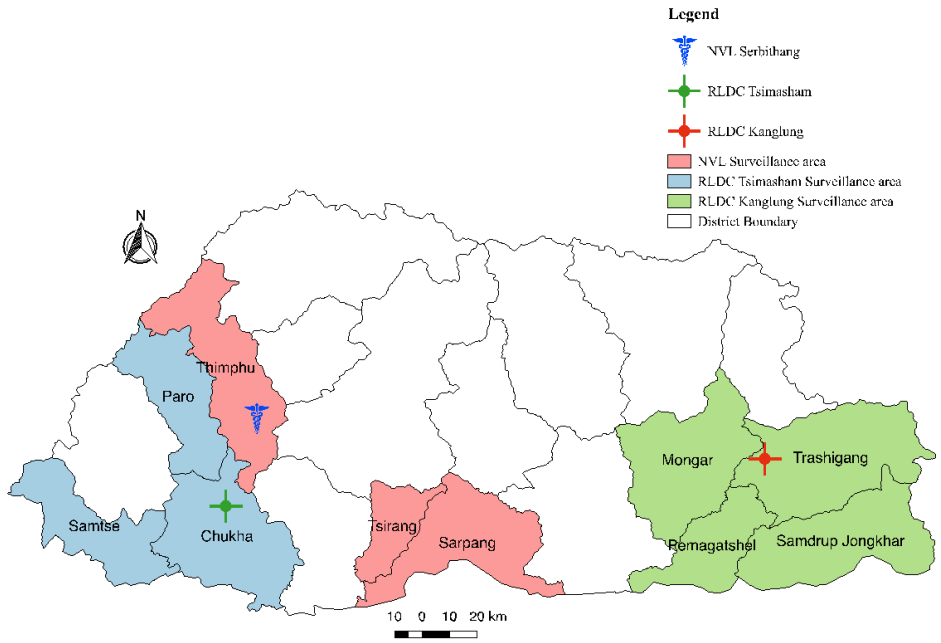
Source	Organisms	Prevalence (%)	Resistance pattern to Antimicrobials	References
Imported chicken carcass (N=400)	*Salmonella* (n=52)	Overall (13)		Ellerbroek et al, 2010. *Jrnl of Food Protection*, 73(2) 376-379
	S. entiridis (n=44)	84.6	NA (95.5%) AMX(13.6%) CE, (4.5%), CIP (2.3%) TMP, (2.3%) MDR (40/42) 95.2%	
	S. typhymurium (n=8)	15.4	NA (100%), CE (12.5%) MDR 100%	

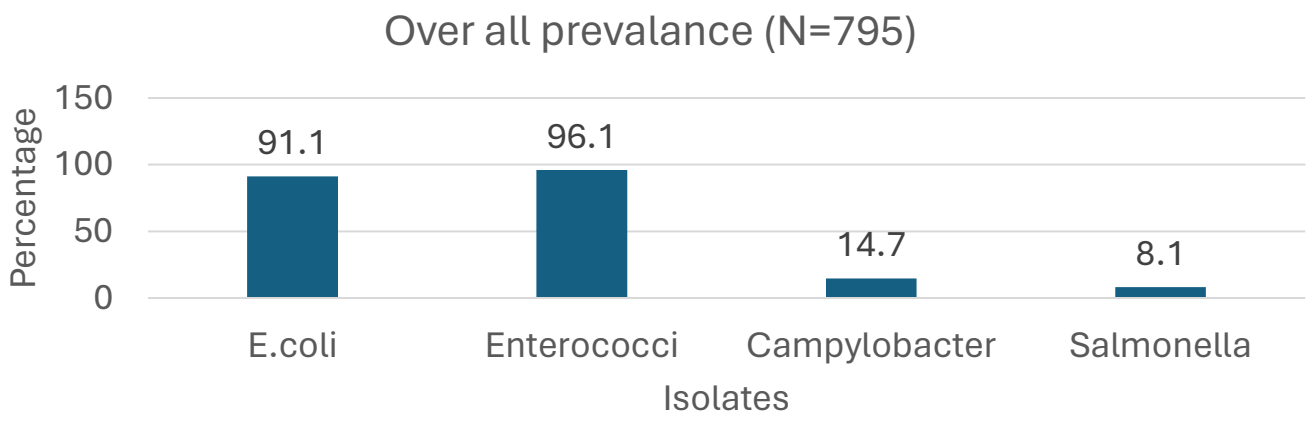
Source	Organisms	Prevalence (%)	Resistance pattern to Antimicrobials	References
Local chicken carcass (N=180)	*Salmonella* (n=23)	Overall (12.8)	TET (95.6%), TMP (86.9%), AMX(65.2%), AMP(47.8%), GENT (13%), S (8.7%); MDR 14(60.9%)	Kinley et al, *Research Square*; 2022. DOI: 10.21203/rs.3.rs-764457/v2
	S. typhymurium (n=17)	73.9		
	S. paratyphi type B (n=6)	26.1		

Source	Organisms	Prevalence (%)	Resistance pattern to Antimicrobials	References
Faecal samples of pigs (Government Pig breeding farms) (N=83)	*E. coli* (n= 2)	Overall 100	AMP, CF, CTX, CIP, S, C, NA, SMZ, TMP, TET, K MDR (CTX-M-15, TEM 1) 2.4%	Sharma et al., (AJAVS) 3, (1) 2017, PP 13-17
	Extended-Spectrum ß-Lactamase (ESBL) Producers	2.4		

9. AMR surveillance in healthy Poultry for target bacteria2022-23- Supported by Fleming Fund

a. Prevalence



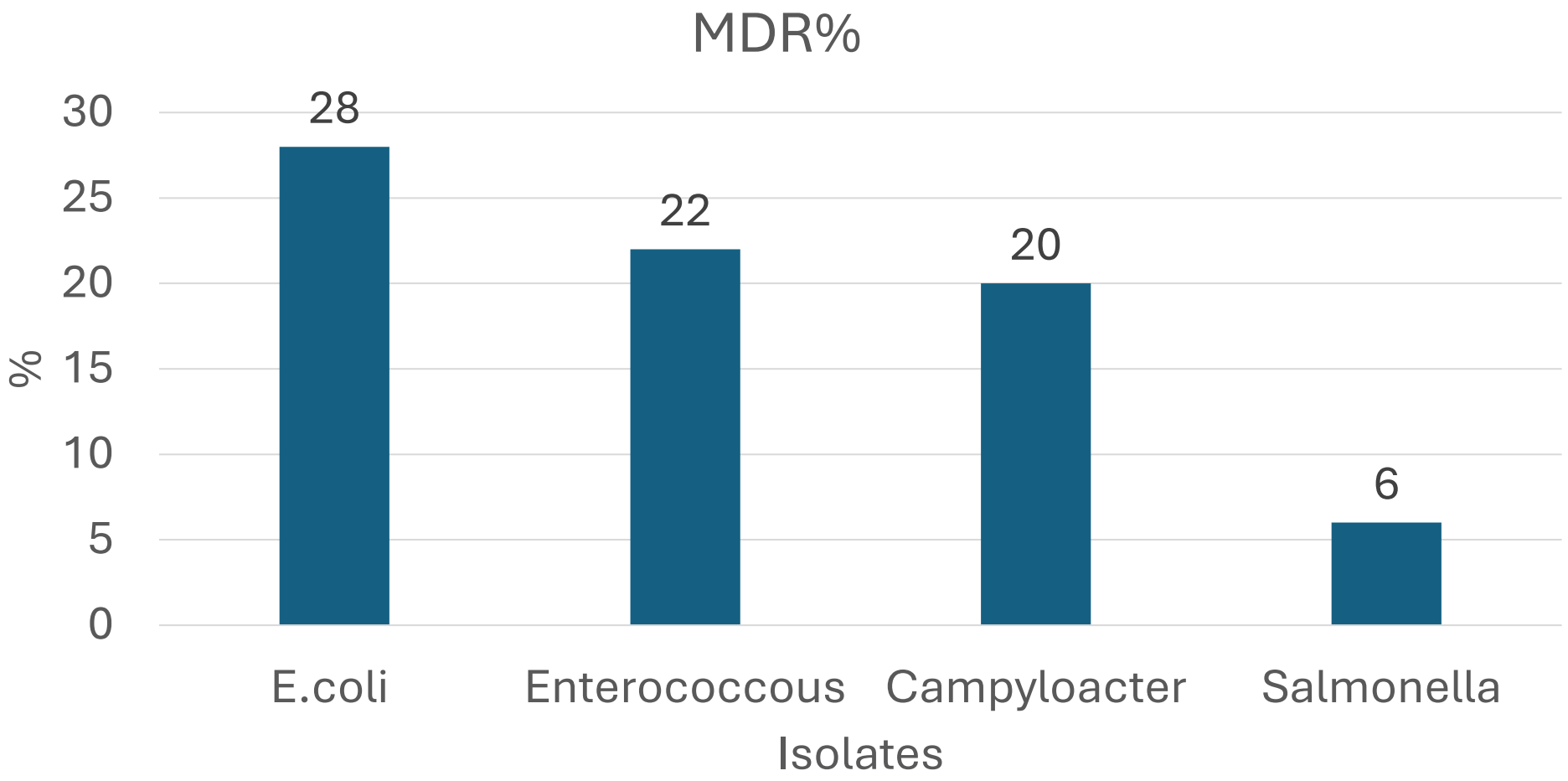


District	Samples (N)
Chhukha	150
Mongar	33
Paro	41
Pema Gatshel	11
S/jonkhar	44
Samtse	191
Sarpang	147
Thimphu	20
Trashigang	29
Tsirang	129
Total	**795**

b. Phenotypic resistance (%) to antibiotics

Antibiotics	Resistance (%)			
	E.coli	*Salmonella* spp	*Enterococcus* spp	*Campylobacter* spp
Gentamicin	1	0	--	11
Chloramphenicol	5	2	2	--
Tetracycline	60	28	39	21
Cefepime	0	--	--	--
Trimethoprim–Sulfamethoxazole	42	18	--	--
Meropenem	0	0	--	--
Ampicillin	21	8	3	10
Nalidixic acid	34	25	--	97
Ciprofloxacin	11	2	--	95
Ceftriaxone	2	0	--	--
Erythromycin	--	--	27	18
Quinupristin-dalfopristin	--	--	38	--
Tigecycline	--	--	19	--
Streptomycin	--	--	--	23

c. Multidrug resistance in target isolates



10. Antimicrobial consumption in livestock sector(2017-2021)

Table 4. Consumption of different classes of antimicrobials by livestock in Bhutan.

Class	Amounts Consumed (kg)				
	2017	2018	2019	2020	2021
Aminoglycosides	14.63	9.82	2.10	17.58	25.03
Amphenicols	1.43	1.31	1.20	1.60	1.20
1st- and 2nd-generation cephalosporins	66.76	15.08	24.02	0.00	1.11
3rd- and 4th-generation cephalosporins	2.81	2.99	5.23	5.42	13.36
Fluoroquinolones	3.74	4.23	7.23	3.09	4.85
Penicillins	65.40	49.65	74.94	20.68	12.63
Sulphonamides	23.56	129.51	211.18	222.52	167.51
Trimethoprim	27.21	23.74	38.12	37.76	29.30
Tetracyclines	285.15	295.10	95.58	59.49	105.58
Others *	8.17	82.01	109.60	94.33	127.31
Total (kg)	498.86	613.43	569.20	462.47	487.89

* Metronidazole and nitrofurazone.

Gurung, et al, *Antibiotics* 2023, 12(411)

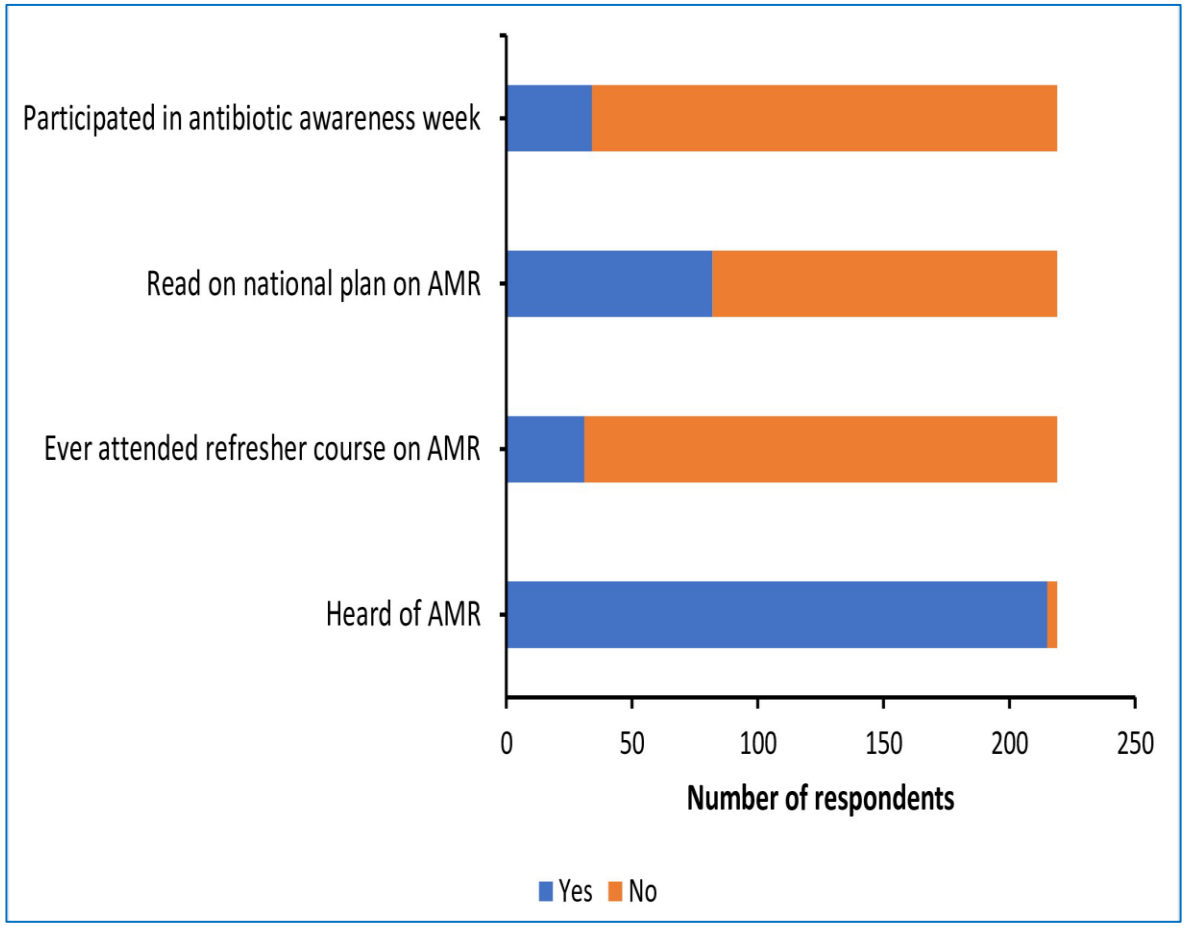
No significance difference in consumption pattern

11. KAP survey on antibiotic use & AMR (N=219 AH workers)

- 215 (98%) of the respondents

had heard of AMR

- 112 (51.1%) had favorable attitude on antibiotic usage and AMR
- 146 (66%) had good practices on antibiotic use.



- Wangmo et al, 2021. PLoS ONE 16(5): e0251327
- Knowledge and awareness on antibiotics and AMR

12. Antibiotic prescriptions in veterinary consultations- 2017

- 31% of the consultations resulted in antibiotic prescription with highest in poultry sps. and common cases prescribed were for diarrhea and wound.
- 45%- 70% antibiotics prescribed corresponded to AWaRe's access group & 25% to AWaRe's watch group of WHO.
- 70% of antibiotics dispensed belonged to VCIA

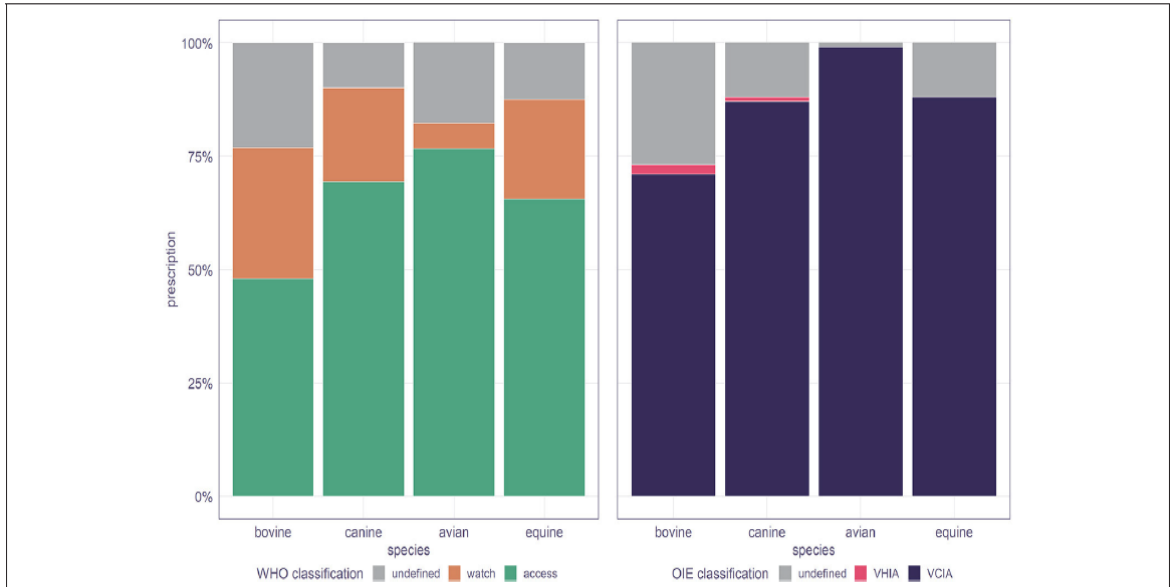


FIGURE 5 | Antibiotics prescribed to different species in veterinary consultation records of the WRLDj of Bhutan in 2017, stratified according to the *AWaRe index* and OIE classification. VCIA, veterinary critically important antimicrobial agents; VHIA, veterinary highly important antimicrobial agents.

Villanueva-Cabezas et al, 2021 Front. Vet. Sci. 8:641488. doi: 10.3389/fvets.2021.641488

13. Way forward

A. Governance

- Setting up Antimicrobial stewardship unit at National Veterinary Hospital (under Fleming Fund country grant phase II)

B. Awareness/Education

- Updating curriculum and module on AMR at CNR
- Conduct in-service and preservice training on AMR
- Develop TV and radio program on animal health

C. Research & Surveillance system

- Conduct research on AMR- on other species of animals- dairy
- Continue surveillance in AMU/AMC

Thank You


National AMR Symposium
"Rethinking Better Management of Emerging Infectious Diseases (EIDs) and Antimicrobial Resistance (AMR)"
11th – 13th April 2024
Venue: Terma Linca Resort and Spa, Babesa, Thimphu
Organized by: Khesar Gyalpo University of Medical Sciences of Bhutan
Technical Partner: Fleming Fund Project, MoH
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ACCESS health international
sanofi