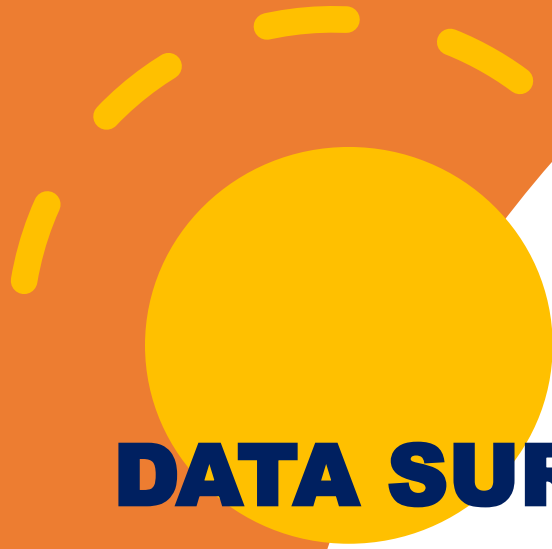




DATA SURVELAN AMR KEBANGSAAN

2018 - 2021

Target Specimens

Target specimens for bacteria isolation and sample location

Sample Location	Target Specimen
1. Poultry Farm	Cloacal swabs
2. Pig Farm	Rectal swabs
3. Dairy Farm	Faecal swabs
4. Poultry slaughterhouse	Meat
5. Pig abattoir	Meat



Surveillance Sites

Surveillance sites of AMR surveillance

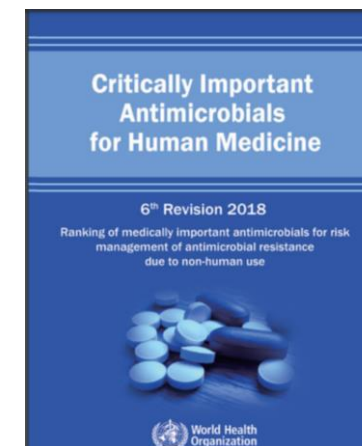
Sample Location	Surveillance sites	Target Age
1. Poultry Farm	• Broiler chicken farm • Layer chicken farm	• Market Age (38 – 42 days) • Laying age (21 – 32 weeks)
2. Pig Farm	• Fattening pig farm	• Market Age
3. Dairy Farm	• Dairy cattle	• Production age
4. Slaughterhouse	• Poultry slaughterhouse • Pig abattoir	

No.	Antimicrobial agents (Choose)	¹ Animal Health	¹ Human Medicine
1	Ampicillin	VCIA	CIA
2	Ceftiofur	VCIA	CIA
3	Cefotaxime	-	CIA
4	Chloramphenicol	-	HIA
5	Ciprofloxacin	VCIA	CIA
6	Colistin	VHIA	HIA
7	Gentamicin	VCIA	CIA
8	Streptomycin	VCIA	CIA
9	Tetracycline	VCIA	CIA
10	Trimethoprim/ Sulphamethoxazole	VCIA	HIA
11	Enrofloxacin	VCIA	-
12	Erythromycin	VCIA	CIA

Antimicrobials choose

CATEGORISATION OF VETERINARY IMPORTANT ANTIMICROBIALS FOR FOOD-PRODUCING ANIMALS

ANTIMICROBIAL FAMILY	SPECIES	% quinolones	Specific comments	Criteria used for categorisation			
				C1: Quinolone > 50%	C2: Essential for few alternatives	ICA	IVA
AMINOGLYCOSIDES Spectinomycin	AUS, BDU, CAP, COL, LEP, DCH, PLE, SUL						
AMINOGLYCOSIDES Biosphoryl	APL, AUS, BDU, CAP, COL, LEP, DCH, PLE, SUL		The wide range of applications and the nature of the diseases treated make aminoglycosides extremely important for veterinary medicine.				
Chlortetracycline	AUS, BDU, CAP, COL, LEP, DCH, SUL		Aminoglycosides are of importance in respiratory and urinary infections.				
Fransylate	BDU, CAP, COL, LEP, DCH, SUL	77.1%		Y	Y	Y	
Kanamycin	AUS, BDU, COL, LEP, DCH, PLE, SUL		Streptomycin is indicated for Pseudomonas aeruginosa infections with few alternatives.				
Neomycin	APL, AUS, BDU, CAP, COL, LEP, DCH, PLE, SUL		Streptomycin is used only in animals. If new alternative alternatives are available.				
Paromomycin	CAP, COL, LEP, DCH, SUL						
Apramycin	AUS, BDU, CAP, COL, LEP, DCH, SUL						
Genamycin	AUS, BDU, CAP, COL, LEP, DCH, SUL						
Tetracycline	AUS, BDU, CAP, COL, LEP, DCH, SUL						
ANSALICIN - RIFAMYCIN Rifampin	BDU, CAP, COL, LEP, DCH, SUL	30%	This antimicrobial class is authorised only in a few countries and with a few alternatives (mostly) and is used for the treatment of rhinotracheal and equine infections in foals.	N	Y		Y
BIOTICOLIN Biotin	BDU, CAP, COL, LEP, DCH, SUL	1.4%	Biotin is used for digestive and respiratory diseases in cattle and equines in foals.	N	N		Y



Antimicrobials of Interest

The list of antimicrobials of interest for the sensitivity test is compiled based on antimicrobials used in both human and animal health.

List of antimicrobials for surveillance of AMR in livestock and animal-related food products

¹ **VCIA** = Veterinary Critically Important Antimicrobials, **VHIA**= Veterinary Highly Important Antimicrobials, **CIA**= Critically Important Antimicrobials, **HIA**= Highly Important Antimicrobials.

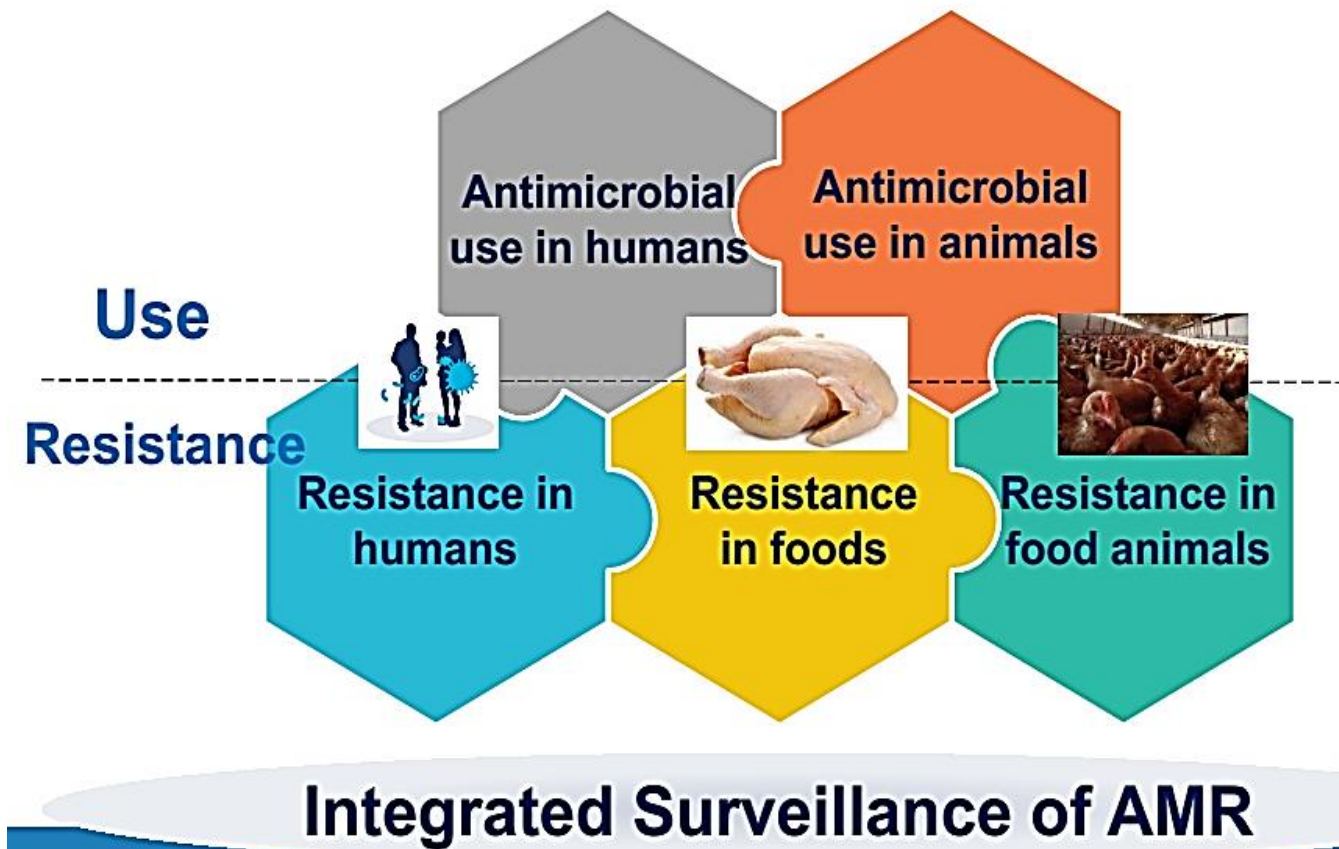
Ref; OIE list of antimicrobial agents of Veterinary Importance (2015) and Critically Important Antimicrobial agents for Human Medicine (2016).

Develop Malaysian Integrated Surveillance Manual on Antimicrobial Resistance

Indicator: Manual on Malaysian Integrated Surveillance on Antimicrobial Resistance developed (2018)

2021

DVS has revised the latest draft for integrated surveillance manual and submitted to NARC Secretariat MOH in August 2021.



CHAPTER 1: SURVEILLANCE OF ANTIMICROBIAL RESISTANCE IN HUMAN HEALTH

Background

The National Antimicrobial Resistance Surveillance in Malaysia for human health was first established in 1990 as part of the Ministry of Health (MOH) effort to decelerate the local rate of antibiotic resistance and reduce the transmission of resistant materials in medical set up and facilities. Since its foundation until present, the surveillance programme is coordinated by the Institute for Medical Research (IMR). At the initial phase of the programme, 16 government hospitals participated but the programme has expanded significantly owing to increasing engagement of hospitals from the government, universities as well as private agencies. For the purpose of MARRS, this system is further enhanced and strengthened to align it with the intersectoral efforts in Malaysia. This chapter describes the integrated surveillance designed for human health in Malaysia.

Surveillance of Antimicrobial Resistance in Hospitals

Objectives

- I. To determine the frequency of isolation of *Salmonella* and *Escherichia coli* from blood, faecal, and urine samples.
- II. To monitor the occurrence of antibiotic resistance among *Salmonella* and *Escherichia coli* clinical isolates.
- III. To discern the trends of antibiotic resistance among *Salmonella* and *Escherichia coli* isolates.

Surveillance Structure System

Target Organism and Specimen

- I. *Salmonella* spp from blood and stool
- II. *Escherichia coli* from blood and urine

Surveillance Sites

- I. The Ministry of Health and the Ministry of Education (MOE) hospitals. Private healthcare facilities will be included when the data are available.

Objectives of AMR Surveillance



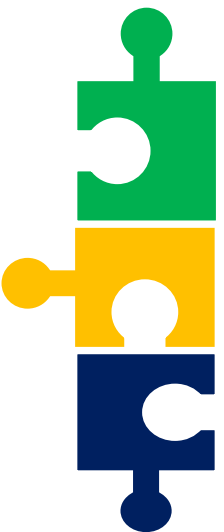
*To determine the prevalence of antimicrobial resistance (AMR) of *Salmonella* spp. and *Escherichia coli* (E. coli) from food-producing animals (poultry, pigs and dairy cattle) in the farm and animal food products at slaughterhouses (poultry and pork meat).*



*To monitor the pattern of AMR among *Salmonella* and *E. coli* in livestock and animal-food products over years.*



To determine susceptibility status of antibiotic in animal.





Terrestrial Animal Health Code

Section-6: Veterinary Public Health

CHAPTER 6.8

Harmonisation of national antimicrobial resistance surveillance and monitoring programmes

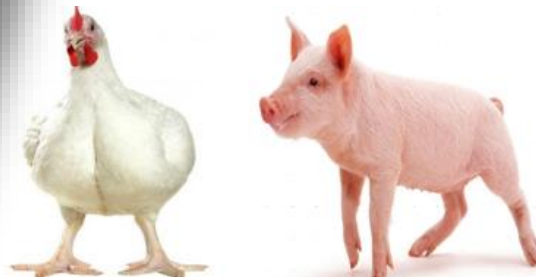
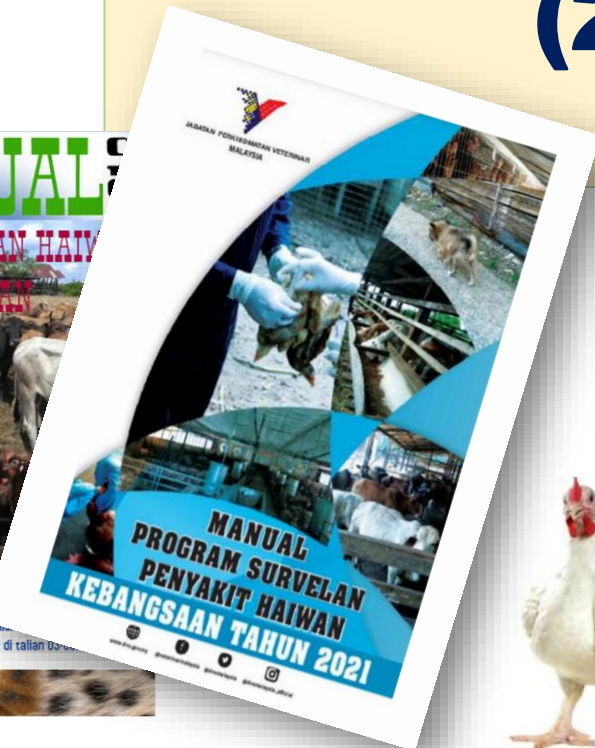
Manual of Diagnostic tests and Vaccine for Terrestrial Animals

GUIDELINE 3.1

Laboratory methodologies for bacterial antimicrobial susceptibility testing

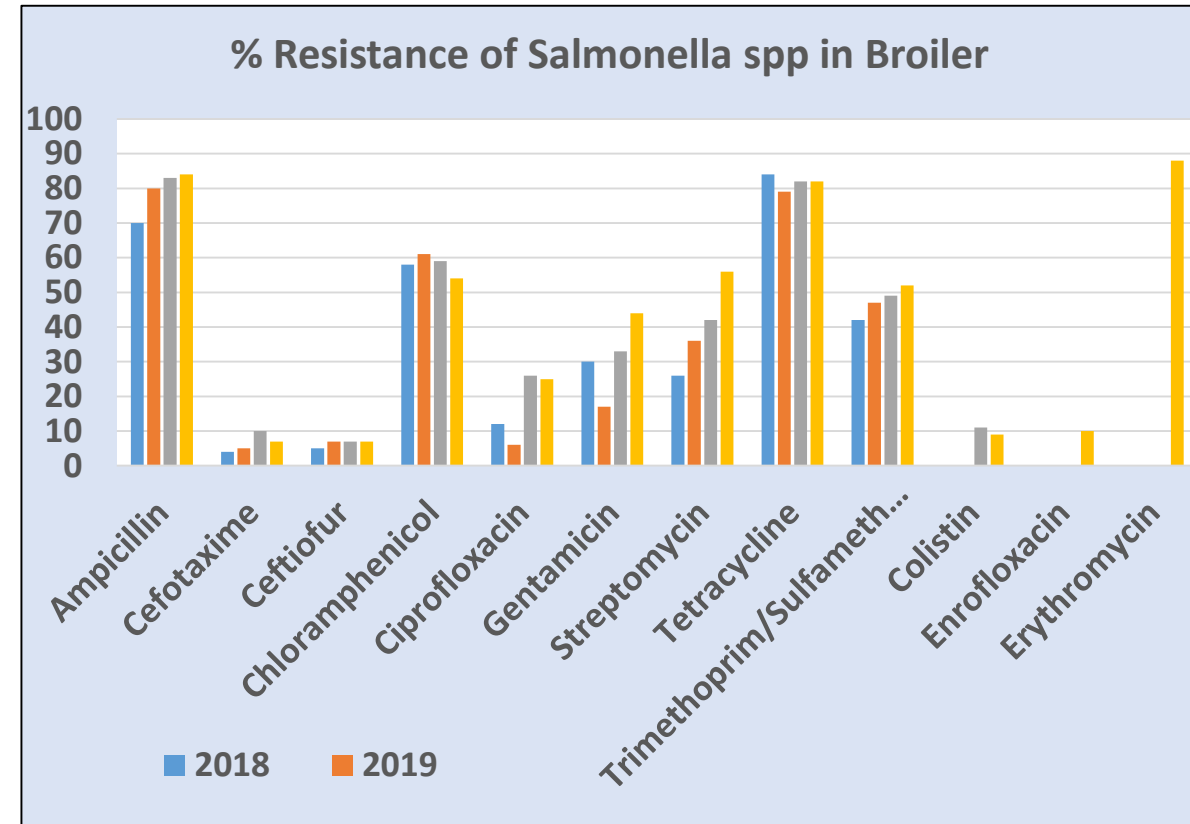


AMR Surveillance Findings in livestock production (2018-Oct 2021)



AMR *SALMONELLA Spp.* : BROILER (2018 - Oct 2021)

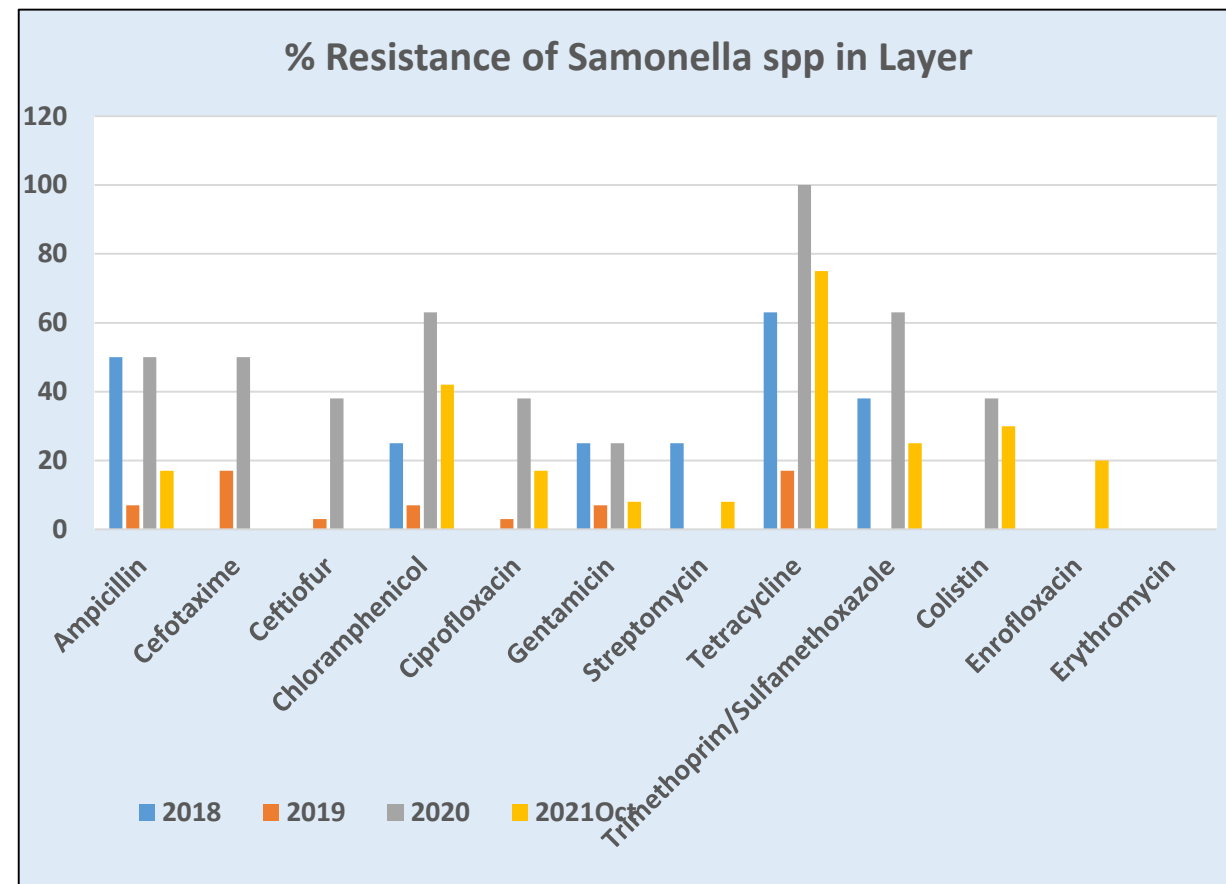
Antibiotic name	<i>Salmonella spp.</i> in Broiler											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	70	80	83	84	1	1	1	1	29	19	16	15
Cefotaxime	4	5	10	7	2	2	3	0	94	93	87	93
Ceftiofur	5	7	7	7	1	1	2	2	94	92	91	92
Chloramphenicol	58	61	59	54	1	1	4	5	41	39	37	41
Ciprofloxacin	12	6	26	25	70	68	32	68	18	27	37	4
Gentamicin	30	17	33	44	5	10	4	3	65	74	62	53
Streptomycin	26	36	42	56	44	33	11	34	29	31	39	8
Tetracycline	84	79	82	82	1	4	1	1	15	17	17	17
Trimethoprim/Sulfamethoxazole	42	47	49	52	2	1	1	1	56	52	50	47
Colistin			11	9			47	1			36	90
Enrofloxacin				10				62				29
Erythromycin				88				13				0



Note : The antimicrobial of interest for the sensitivity test is chosen based on antimicrobial used both in human and animal health.

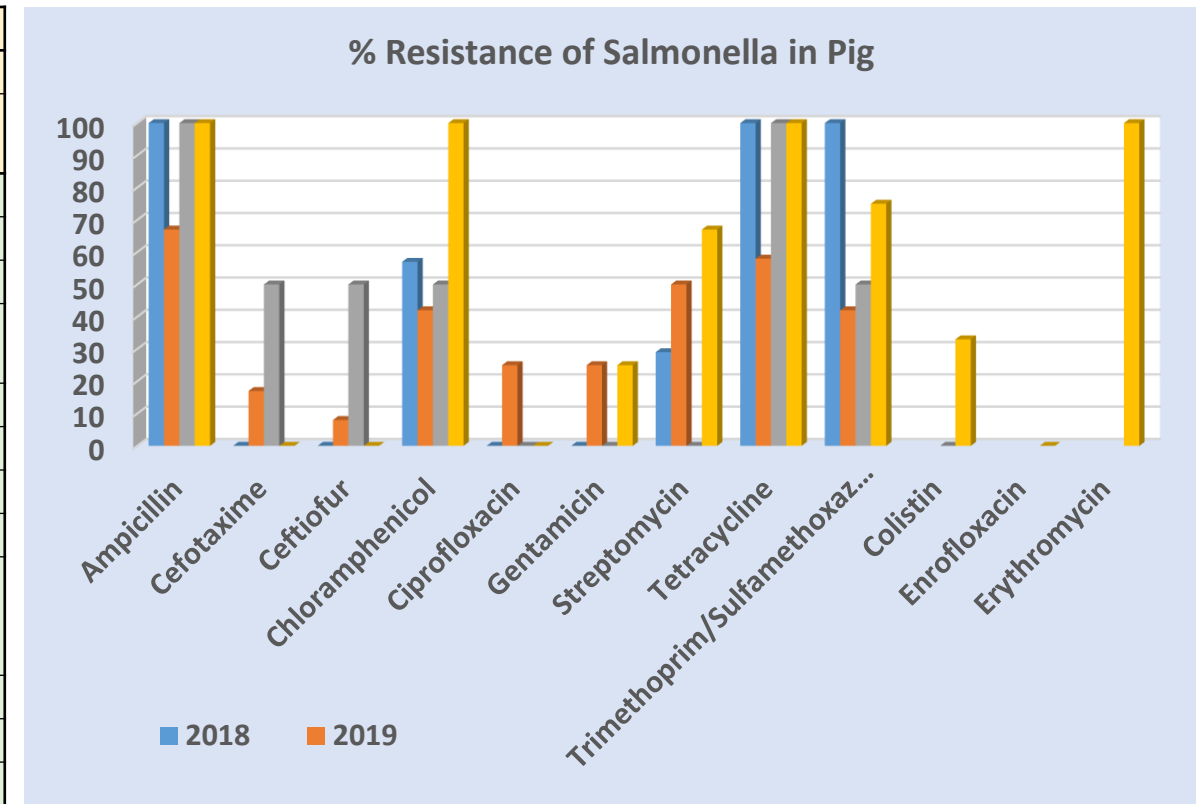
AMR *SALMONELLA Spp.* : LAYER (2018-Oct 2021)

Antibiotic name	<i>Salmonella spp.</i> in Layer											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	50	7	50	17	0	0	0	0	50	93	50	83
Cefotaxime	0	17	50	0	0	7	0	0	100	77	50	100
Ceftiofur	0	3	38	0	0	0	0	0	100	97	63	100
Chloramphenicol	25	7	63	42	0	0	0	17	75	93	38	42
Ciprofloxacin	0	3	38	17	63	33	63	83	38	63	0	0
Gentamicin	25	7	25	8	0	0	0	0	75	93	75	92
Streptomycin	25	0	0	8	63	3	33	75	13	97	0	8
Tetracycline	63	17	100	75	0	3	0	0	38	80	0	25
Trimethoprim/Sulfamethoxazole	38	0	63	25	0	0	0	0	63	100	38	75
Colistin			38	30			13	0			0	70
Enrofloxacin				20				50				30
Erythromycin												



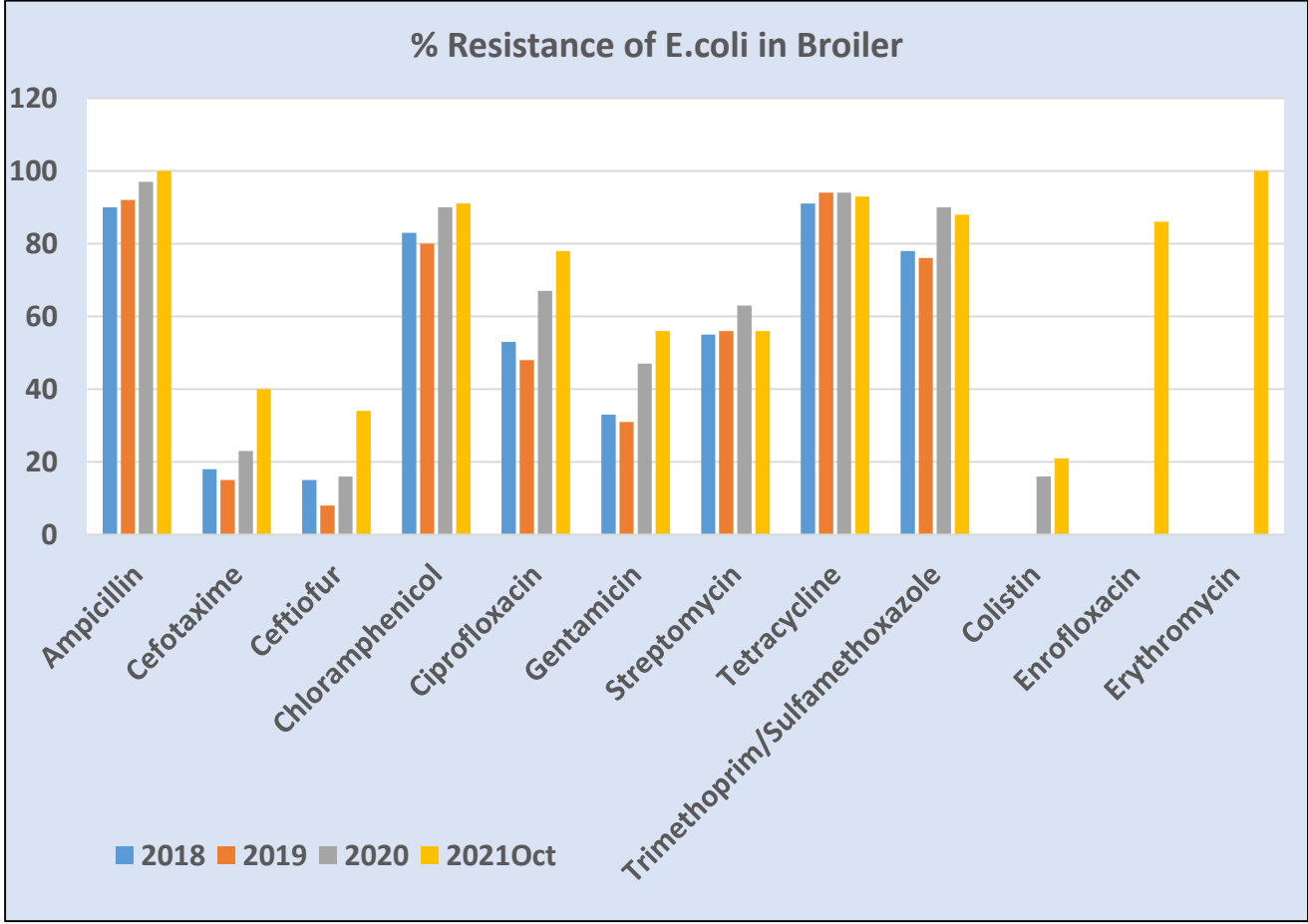
AMR *SALMONELLA* Spp.: PIG (2018 - Oct 2021)

Antibiotic name	<i>Salmonella</i> Spp. in Pig											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	100	67	100	100	0	0	0	0	0	33	0	0
Cefotaxime	0	17	50	0	0	0	0	0	100	83	50	100
Ceftiofur	0	8	50	0	0	8	0	0	100	83	50	100
Chloramphenicol	57	42	50	100	0	0	0	0	43	58	50	0
Ciprofloxacin	0	25	0	0	57	67	50	100	43	8	50	0
Gentamicin	0	25	0	25	0	0	0	0	100	75	100	75
Streptomycin	29	50	0	67	57	8	50	0	14	42	50	0
Tetracycline	100	58	100	100	0	0	0	0	0	42	0	0
Trimethoprim/Sulfamethoxazole	100	42	50	75	0	0	0	25	0	58	50	0
Colistin			0	33			100	0			0	67
Enrofloxacin				0				100				0
Erythromycin				100				0				0



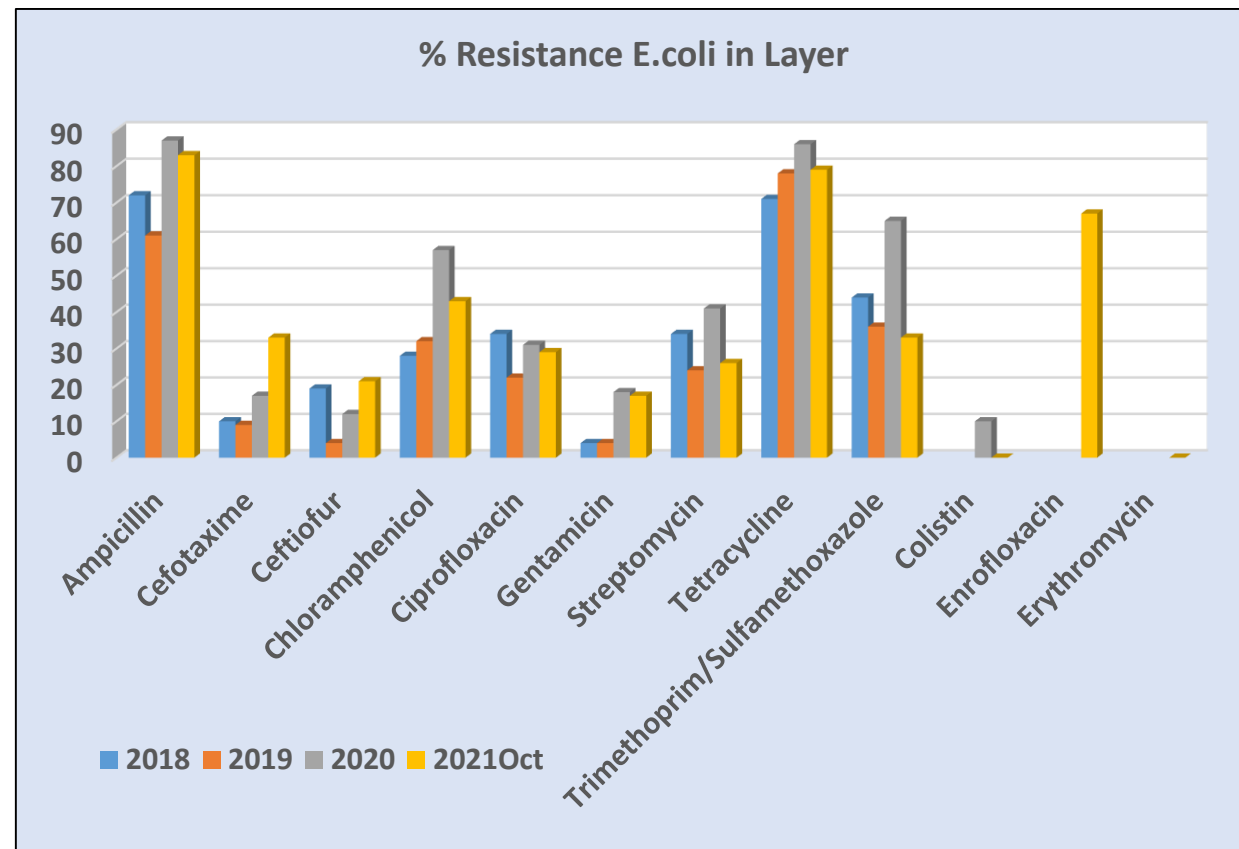
AMR *E. COLI* : BROILER (2018 - Oct 2021)

Antibiotic name	<i>E. coli</i> in Broiler											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	90	92	97	100	1	2	1	0	10	6	2	0
Cefotaxime	18	15	23	40	7	6	5	7	74	79	72	53
Ceftiofur	15	8	16	34	10	5	5	7	75	88	79	59
Chloramphenicol	83	80	90	91	2	2	0	1	15	18	10	8
Ciprofloxacin	53	48	67	78	8	9	8	11	39	43	25	11
Gentamicin	33	31	47	56	14	7	5	5	53	62	48	38
Streptomycin	55	56	63	56	13	12	11	5	32	32	20	18
Tetracycline	91	94	94	93	2	1	0	0	7	5	5	7
Trimethoprim/Sulfamethoxazole	78	76	90	88	0	2	0	0	22	22	10	12
Colistin			16	21			43	0			23	79
Enrofloxacin				86				11				4
Erythromycin				100				0				0



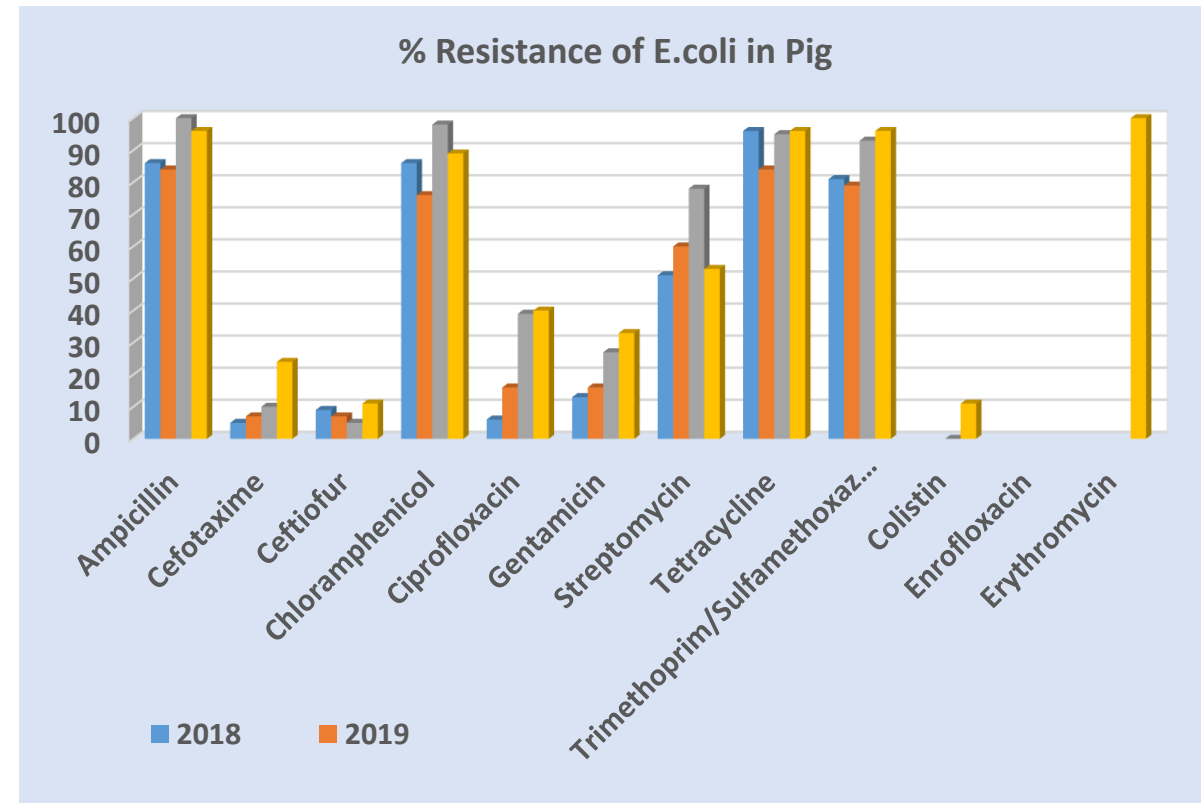
AMR *E. COLI* : LAYER (2018 - Oct 2021)

Antibiotic name	<i>E. coli</i> in Layer											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	72	61	87	83	1	8	3	5	26	32	10	12
Cefotaxime	10	9	17	33	7	6	0	2	83	86	83	64
Ceftiofur	19	4	12	21	11	5	3	7	70	92	85	71
Chloramphenicol	28	32	57	43	17	1	0	2	55	67	43	55
Ciprofloxacin	34	22	31	29	8	9	10	14	59	70	58	57
Gentamicin	4	4	18	17	0	1	1	2	96	95	81	80
Streptomycin	34	24	41	26	11	13	12	26	56	62	42	48
Tetracycline	71	78	86	79	9	5	3	2	20	18	12	19
Trimethoprim/Sulfamethoxazole	44	36	65	33	2	5	0	0	54	59	35	67
Colistin			10	0			43	0			37	100
Enrofloxacin				67				33				67
Erythromycin				0				0				0



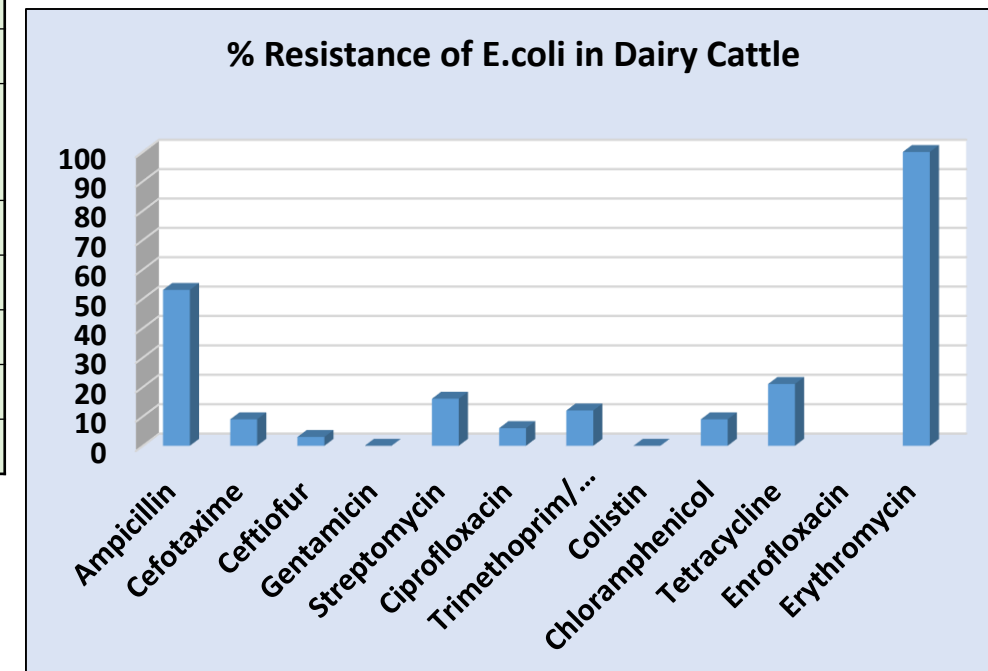
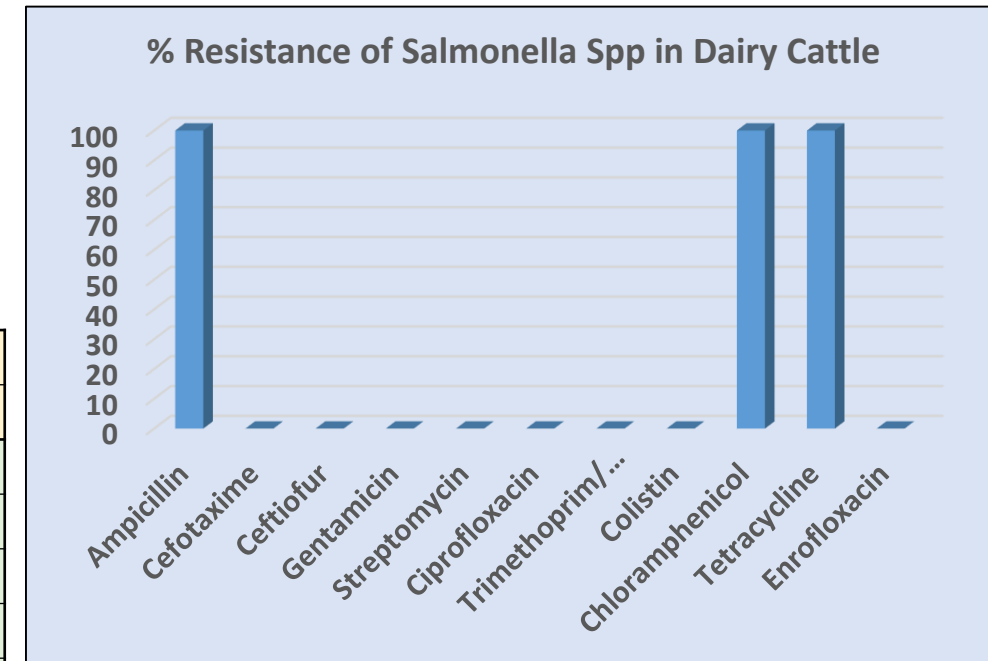
AMR *E. COLI*: PIG (2018 - Oct 2021)

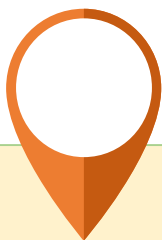
Antibiotic name	<i>E. coli</i> in Pig											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	86	84	100	96	0	3	0	0	14	13	0	4
Cefotaxime	5	7	10	24	5	11	2	4	91	82	88	71
Ceftiofur	9	7	5	11	2	5	3	2	89	89	92	87
Chloramphenicol	86	76	98	89	0	10	0	4	14	15	2	7
Ciprofloxacin	6	16	39	40	11	8	17	22	83	76	44	38
Gentamicin	13	16	27	33	4	0	2	2	83	84	71	64
Streptomycin	51	60	78	53	15	13	15	9	34	27	7	12
Tetracycline	96	84	95	96	0	3	0	2	4	13	5	2
Trimethoprim/Sulfamethoxazole	81	79	93	96	4	2	0	0	15	20	7	4
Colistin			0	11			78	0			22	89
Enrofloxacin												
Erythromycin				100				0				0



AMR *SALMONELLA* Spp. & *E. COLI* : DAIRY CATTLE (JAN – OCT 2021)

Antibiotic Name	<i>Salmonella</i> spp.			<i>E. coli</i>		
	% R	% I	% S	% R	% I	% S
Ampicillin	100	0	0	53	9	38
Cefotaxime	0	0	100	9	15	76
Ceftiofur	0	0	100	3	6	91
Gentamicin	0	0	100	0	3	97
Streptomycin	0	100	0	16	0	84
Ciprofloxacin	0	100	0	6	6	88
Trimethoprim/ Sulfamethoxazole	0	0	100	12	0	88
Colistin	0	0	100	0	0	100
Chloramphenicol	100	0	0	9	0	91
Tetracycline	100	0	0	21	0	79
Enrofloxacin	0	0	100			
Erythromycin				100	0	0





AMR Surveillance Findings (2018-Oct 2021) in Food of Animal Origin



DATA ANALISIS SURVELAN AMR DI RUMAH SEMBELIH AYAM DAN BABI TAHUN 2018 – Okt 2021

2018				
Animal Products	Bil abatoir	Bil sample	Bil isolates	
			<i>Salm spp</i>	<i>E. coli</i>
Chicken meat	12	539	48	10
Pork meat	7	332	11	24

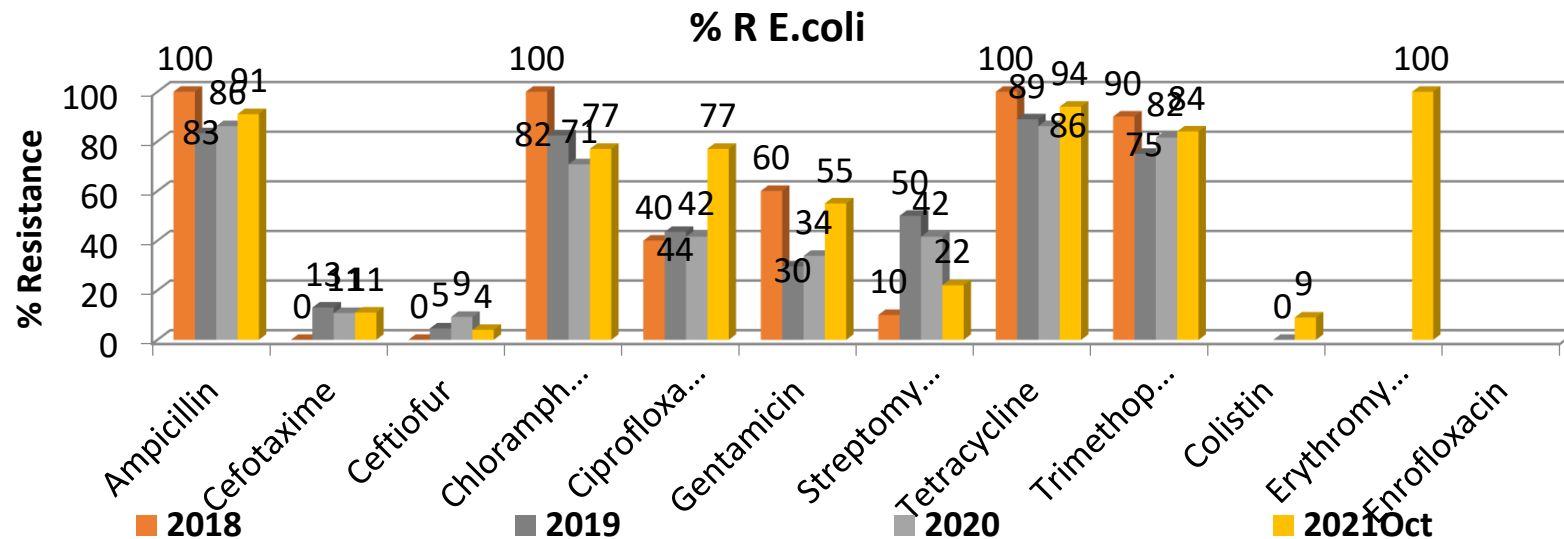
2019				
Animal Products	Bil abatoir	Bil sample	Bil isolates	
			<i>Salm spp</i>	<i>E. coli</i>
Chicken meat	26	1006	69	106
Pork meat	21	458	22	92

2020				
Animal Products	Bil abatoir	Bil sample	Bil isolates	
			<i>Salm spp</i>	<i>E. coli</i>
Chicken meat	28	1011	47	66
Pork meat	9	458	16	46

2021 Oct				
Animal Products	Bil abatoir	Bil sample	Bil isolates	
			<i>Salm spp</i>	<i>E. coli</i>
Chicken meat	28	1011	66	141
Pork meat	28	456	25	73

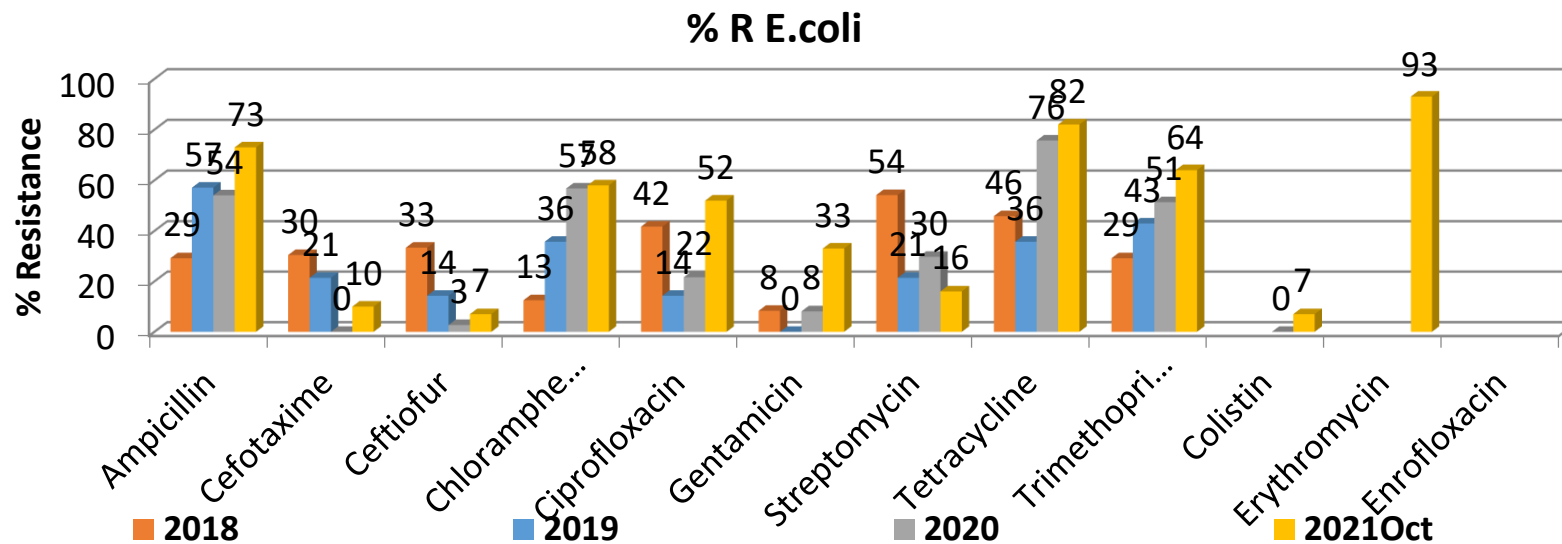
AMR *E. coli* CHICKEN MEAT

Antibiotic name	Chicken Meat											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	100	83	86	91	0	1	0	3	0	16	14	6
Cefotaxime	0	13	11	11	10	7	6	4	90	80	83	86
Ceftiofur	0	5	9	4	10	9	6	3	90	86	85	93
Chloramphenicol	100	82	71	77	0	1	2	6	0	17	28	17
Ciprofloxacin	40	44	42	77	10	10	9	8	50	46	49	16
Gentamicin	60	30	34	55	0	11	9	2	40	59	57	43
Streptomycin	10	50	42	22	40	11	11	11	50	39	48	19
Tetracycline	100	89	86	94	0	3	5	1	0	8	9	5
Trimethoprim/ Sulfamethoxazole	90	75	82	84	0	0	2	0	10	25	17	16
Colistin			0	9			3	68			82	0
Erythromycin				100				0				0
Enrofloxacin												



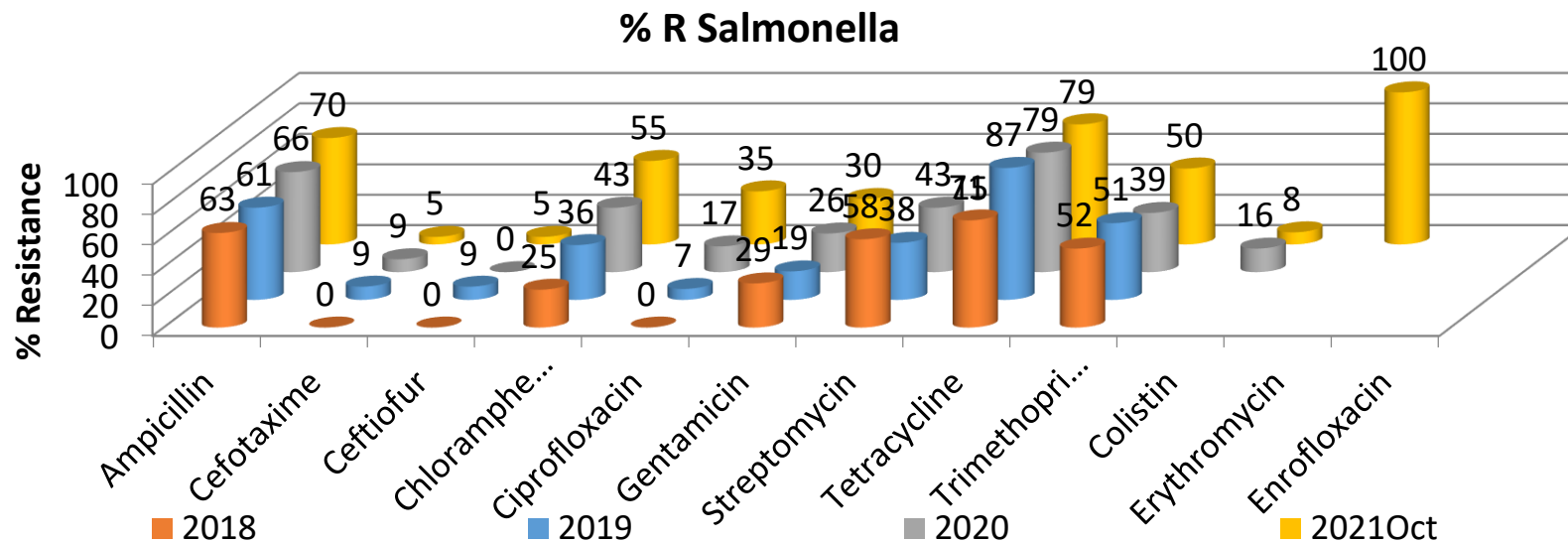
AMR *E. coli* PORK MEAT

Antibiotic name	Pork Meat											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	29	57	54	73	0	14	5	8	71	29	41	19
Cefotaxime	30	21	0	10	0	0	5	0	70	79	95	90
Ceftiofur	33	14	3	7	0	7	8	3	67	79	89	90
Chloramphenicol	13	36	57	58	0	0	5	8	88	64	38	34
Ciprofloxacin	42	14	22	52	8	7	5	12	50	79	73	36
Gentamicin	8	0	8	33	4	0	8	3	88	100	84	64
Streptomycin	54	21	30	16	13	14	16	12	33	64	54	30
Tetracycline	46	36	76	82	8	0	0	3	46	64	24	15
Trimethoprim/Sulfamethoxazole	29	43	51	64	4	0	3	1	67	57	46	34
Colistin			0	7			5	74			84	0
Erythromycin				93				7				0
Enrofloxacin												



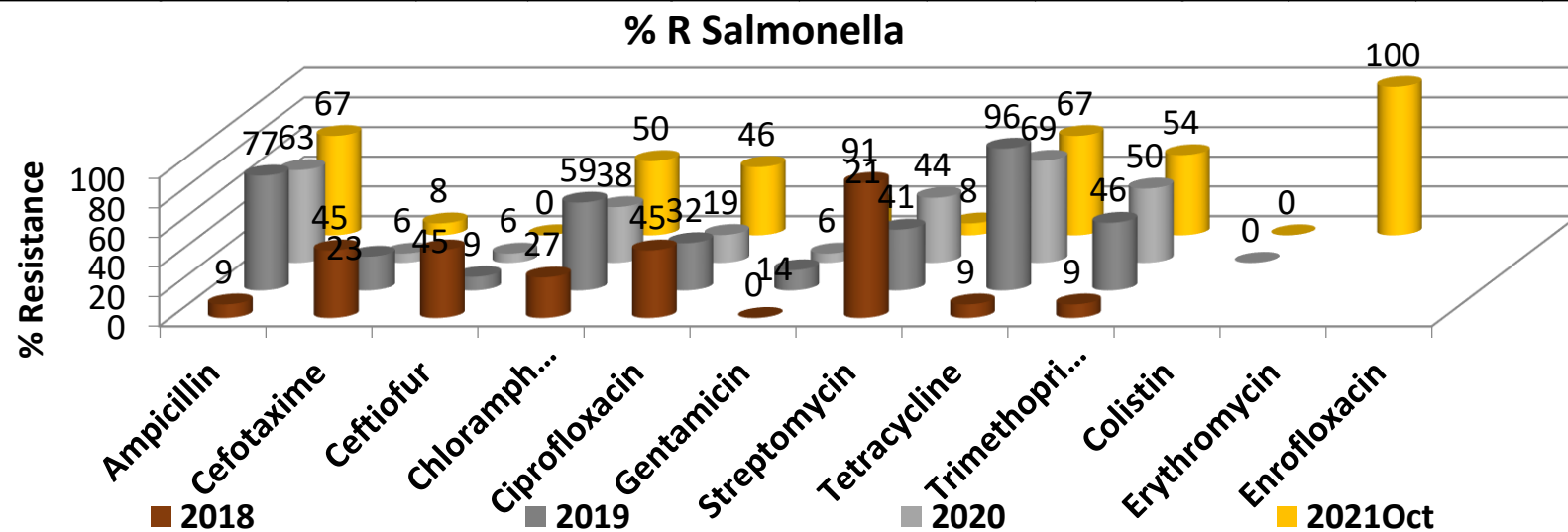
AMR *Salmonella* spp. CHICKEN MEAT

Antibiotic name	Chicken Meat											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	63	61	66	70	0	0	4	2	38	39	30	29
Cefotaxime	0	9	9	5	0	12	2	11	100	80	89	85
Ceftiofur	0	9	0	5	0	10	6	2	100	81	94	94
Chloramphenicol	25	36	43	55	0	1	6	5	75	62	51	41
Ciprofloxacin	0	7	17	35	0	64	28	48	100	29	36	11
Gentamicin	29	19	26	30	0	12	4	3	71	70	70	67
Streptomycin	58	38	43	15	2	17	9	12	40	45	43	30
Tetracycline	71	87	79	79	0	3	0	0	29	10	21	21
Trimethoprim/Sulfamethoxazole	52	51	39	50	0	3	0	0	48	46	61	50
Colistin			16	8			7	78			38	0
Erythromycin				100				0				0
Enrofloxacin												



AMR *Salmonella* spp. PORK MEAT

Antibiotic name	Pork Meat											
	% R				% I				% S			
	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct	2018	2019	2020	2021 Oct
Ampicillin	9	77	63	67	0	0	6	0	91	23	31	3
Cefotaxime	45	23	6	8	0	18	6	4	55	59	88	88
Ceftiofur	45	9	6	0	0	36	13	17	55	55	81	83
Chloramphenicol	27	59	38	50	0	0	0	0	73	41	63	50
Ciprofloxacin	45	32	19	46	9	55	25	38	45	14	44	13
Gentamicin	0	14	6	21	0	5	0	0	100	82	94	79
Streptomycin	91	41	44	8	0	23	19	13	9	36	38	33
Tetracycline	9	96	69	67	0	0	0	0	91	5	31	33
Trimethoprim/Sulfamethoxazole	9	46	50	54	0	0	0	0	91	55	50	46
Colistin			0	0			31	92			56	0
Erythromycin				100				0				0
Enrofloxacin												





TERIMA KASIH

