AFCD's measures in addressing Antimicrobial Resistance (AMR) in Hong Kong

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Hong Kong's response to AMR

- In **May 2016**, the Government set up a **High Level Steering Committee on AMR (HLSC)** to **formulate strategies** in **collaboration** with the **relevant sectors** to tackle the **AMR threat**.
- Under HLSC, **Expert Committee on Antimicrobial Resistance (EC)** was established in **October 2016** to provide **expert opinions** on **priority areas for actions** for HLSC's consideration.
- **Hong Kong Strategy and Action Plan on Antimicrobial Resistance** was launched in **July 2017**, adopting the principles of the **WHO Global Action Plan** and **One Health Approach**

Hong Kong Strategy and Action Plan on Antimicrobial Resistance

- **Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2017-2022)** was **launched in July 2017.** It outlined activities under **six key areas**:
  1. *Strengthen knowledge through surveillance and research*
  2. *Optimise use of antimicrobials in humans and animals*
  3. *Reduce incidence of infection through effective sanitation, hygiene and preventive measures*
  4. *Improve awareness and understanding of AMR through effective communication, education and training*
  5. *Promote research on AMR*
  6. *Strengthen partnerships and foster engagement of relevant stakeholders.*

- **The second 5-year plan: Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2023-27) was launched in November 2022.**

One Health Approach

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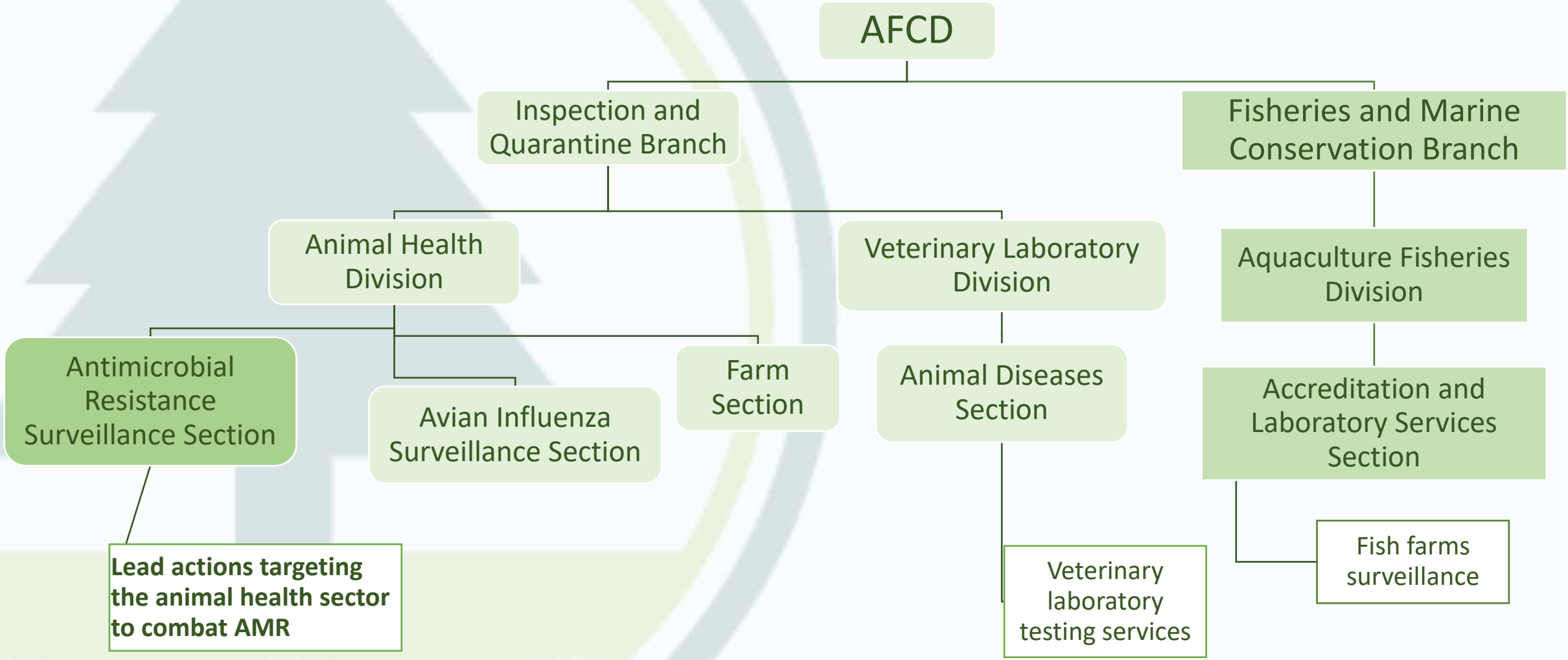
AFCD Organization Chart for AMR



Hong Kong Livestock Production

- **43 licensed pig farms** and **29 licensed poultry farms**
- Among the food supply for local consumption, **12 % live pigs** came from **local farms** while **100 % live chickens** came from **local farms**.
- Supervised by AFCD in accordance with **the Public Health (Animals and Birds) (Licensing of Livestock Keeping) Regulation (Cap. 139L)**
- AFCD had been issuing "**Antibiotic Permit**" to local livestock farmers and **ceased** doing so since **1st January 2025**.
- **Commonly used antibiotics** includes (i) **amoxicillin, tylosin** & **tilmicosin** for **chicken farms** (ii) **amoxicillin, florfenicol** & **lincomycin** for **pig farms**

Hong Kong ’s Fresh Chicken Supply — A Local Perspective (1)

- **Since 2016**, the importation of live chickens from Mainland China was ceased, shifting entirely to **locally produced fresh broilers** to meet market demand.

- The region’s broiler farms are **predominantly located** in **the New Territories**, with a notable concentration in **Yuen Long**.

- Currently, **28 active** licensed farms collectively supply an average of **10,000** to **12,000 live chickens** daily, ensuring a steady flow of fresh chicken to local markets.

- The majority of these farms specialise in the production of **yellow-feathered chickens**, a variety favoured by local consumers.

Hong Kong ’s Fresh Chicken Supply — A Local Perspective (2)

- **Small** to **medium** in scale. Each farm typically houses **several hundred** to **a few thousand** birds, sufficient to meet the territory’s fresh poultry needs

- **Day-old chicks** (DOCs) are sourced from three channels: **importation from Mainland China**, **on-farm hatcheries**, and **registered hatcheries** within Hong Kong.

- Broiler chickens are generally categorised :
  - Less than 30 days (小雞early stage)
  - 30–60 days (中雞middle stage)
  - 60–90 days
    - 大雞Fast-growing **broilers-market weight** at around 60 days vs slow-growing varieties -marketed at 90 days.)

Hong Kong ’s Fresh Pig Supply — A Local Perspective (1)

- **Licensed Pig Farms**: 40 active licensed pig farms, primarily situated in the New Territories.

- **Farm Scale and Capacity**:
  - **Small to Medium Operations**: 77% of farms are small (<1,000 pigs) or medium-sized (1,000–2,000 pigs).
  - Total Holding Capacity: About 75,000 pigs, with a current stock of around 60,000.

- **Breed**: Yorkshire (Large white), Landrace, Duroc, Berkshire

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Hong Kong ’s Fresh Pig Supply — A Local Perspective (2)

- Most piglets are bred and raised locally using a **farrow-to-finish system**.
- Suckling Piglets: piglets that have been born but have not yet been weaned from the sow.
- After weaning, pigs are raised specifically for meat production. They are categorized as follows:
- 小豬 (Piglets): Less than 30 kg
- 中豬 (Grower Pigs): 30 to 60 kg
- 大豬 (Finisher Pigs): Over 60 kg (**Market weight around 90-130 kg**)

Role of local Farms in AMR Management

Due to the **limited scale** of Hong Kong's production animal sector, its contribution to the **overall resistance gene pool** in food of animal origin is **minimal**.

Nonetheless, local farms must **uphold robust disease prevention measures** and **implement antimicrobial stewardship programmes** as integral elements of comprehensive farm health management.

Antimicrobial Resistance Surveillance Section

- Established in **2017** in response to the global AMR threat
- To lead the **actions** targeting **Animal Health sector** in **4 key areas** listed in the **Hong Kong Strategy** and **Action Plan** :

1. *Strengthen knowledge through surveillance*
2. *Optimise use of antimicrobials in animals*
3. *Reduce incidence of infection through effective sanitation, hygiene and preventive measures*
4. *Improve awareness and understanding of antimicrobial resistance through effective communication, education and training*

Key Area 1.
Strengthen knowledge through surveillance

- **Consultancy study** was commissioned in **October 2017**

- With the **recommendations** and **findings** of the consultancy study, a **surveillance systems** for **monitoring antimicrobial usage (AMU)** and **antimicrobial resistance (AMR)** on **food animals** were **devised** and **initiated** in **mid-2019**

Antimicrobial usage (AMU) surveillance -Data Collection Approach

Dual Data Sources:

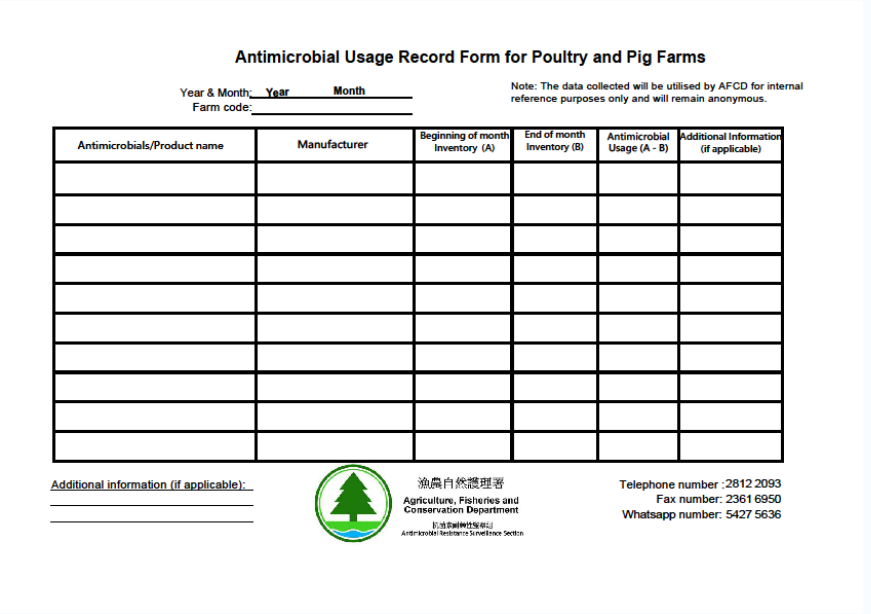
1. **Farmer Reports**: Monthly submissions detailing antimicrobial usage.
2. **Audit Testing**: Independent testing of feed and faecal waste to detect unreported or unknown usage.

Record Keeping:

- **Simple forms** provided to farmers to standardise data collection.

Rationale:

- Comprehensive sales data are unavailable due to limited local drug supply; hence, direct farm-level data and audits are essential.



Antimicrobial Usage Record Form for Poultry and Pig Farms

Year & Month: Year Month
Farm code:

Note: The data collected will be utilised by AFCD for internal reference purposes only and will remain anonymous.

Antimicrobials/Product name	Manufacturer	Beginning of month Inventory (A)	End of month Inventory (B)	Antimicrobial Usage (A - B)	Additional Information (if applicable)

Additional information (if applicable):

漁農自然護理署
Agriculture, Fisheries and Conservation Department
Antimicrobial Resistance Surveillance Section

Telephone number :2812 2093
Fax number: 2361 6950
Whatsapp number: 5427 5636

AMU surveillance -Key Metric : mg/kg TAB

Antimicrobials (in mg):

- active ingredient, antimicrobial class, reported usage in ml (solution) or kg (solid), and concentration in mg/ml (solution) or mg/kg (solid).

Metric: mg /kg TAB (target animal biomass)

Why mg/kg TAB?

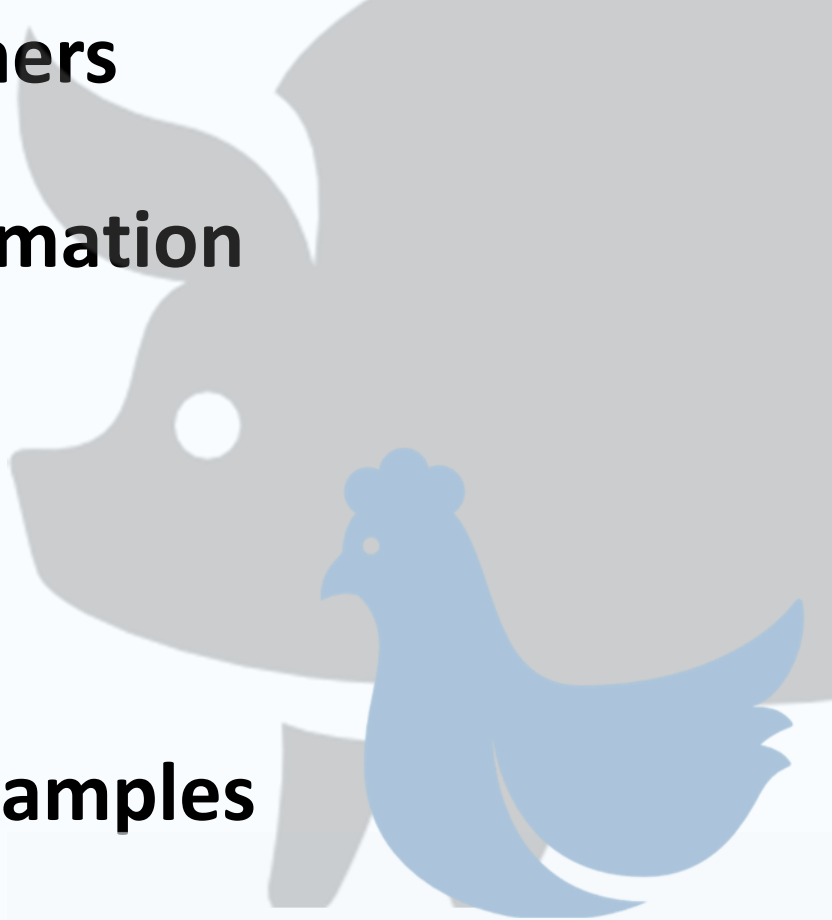
- Chosen as the primary metric based on 2019 consultancy findings.
- Adjusts for total annual animal biomass, allowing **fair comparison** across farms of **varying sizes** and **production levels**.

Calculation

- $AMU\ in\ TAB\ (mg/kg\ TAB)\ in\ pigs$=$(Total\ AM\ in\ mg \div Number\ of\ months\ with\ AMU\ submission\ x$ 12)/$(Number\ of\ finishers\ x$ 130 kg + $Number\ of\ sows\ x$ 240 kg)
- AMU in TAB (mg/kg TAB) in chickens=(Total AM in mg ÷ Number of months with AMU submission x 12)/(Number of broilers x 1.75 kg + Number of breeders x 3 kg)

Antimicrobial Use (AMU) surveillance

- **Monthly reports** submitted **voluntarily** by **farmers**
- **Simple record form for farmers** to **record information** on **storage** and **usage** of **antimicrobials**
- **AMU database** to **record, analyse** and **verify information collected**
- **Audit checks – collection** and **testing** of **audit samples** such as **animal feed** & **faecal wastes** to **detect unreported / inadvertent AMU**



AMU surveillance -Key antimicrobials

WHO 2024 Medically Important Antimicrobials

- The WHO's updated list identifies highest-priority critically important antimicrobials (HPCIAs) that can also be used in animals include:

  - 3rd/4th-generation cephalosporins
  - Fluoroquinolones
  - Colistin
  - Fosfomycin (phosphonic acid derivatives)

Not used in chickens since 2020

Not use in chicken farms

No records use in food animals

AMU Surveillance
Audit Testing of Feed and Faecal Waste

- **Feed testing** commenced in mid-2018
- Total of **516 feed samples** collected and tested from 2018-2024
  - 324 samples from pig farms
  - 192 samples from chicken farms

- **Faecal waste testing** commenced in 2020
- Total of **519 faecal waste samples** collected and tested from 2020-2024
  - 281 samples from pig farms
  - 238 samples from chicken farms

- Results were **crosschecked against farmers' reported AMU**, as well as further inquiries with the farmers

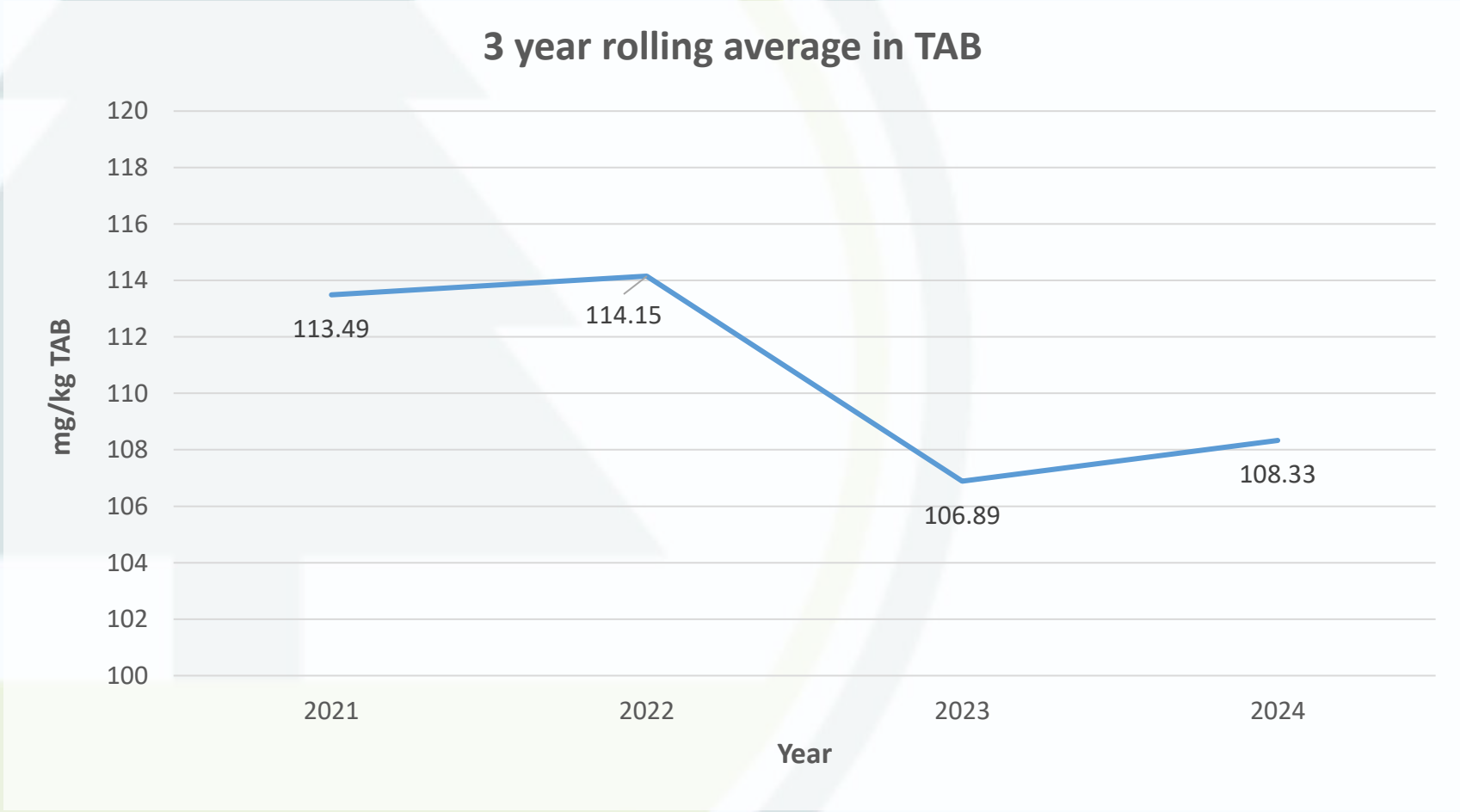
AMU Surveillance – Pig Farms

Key results on antimicrobial usage

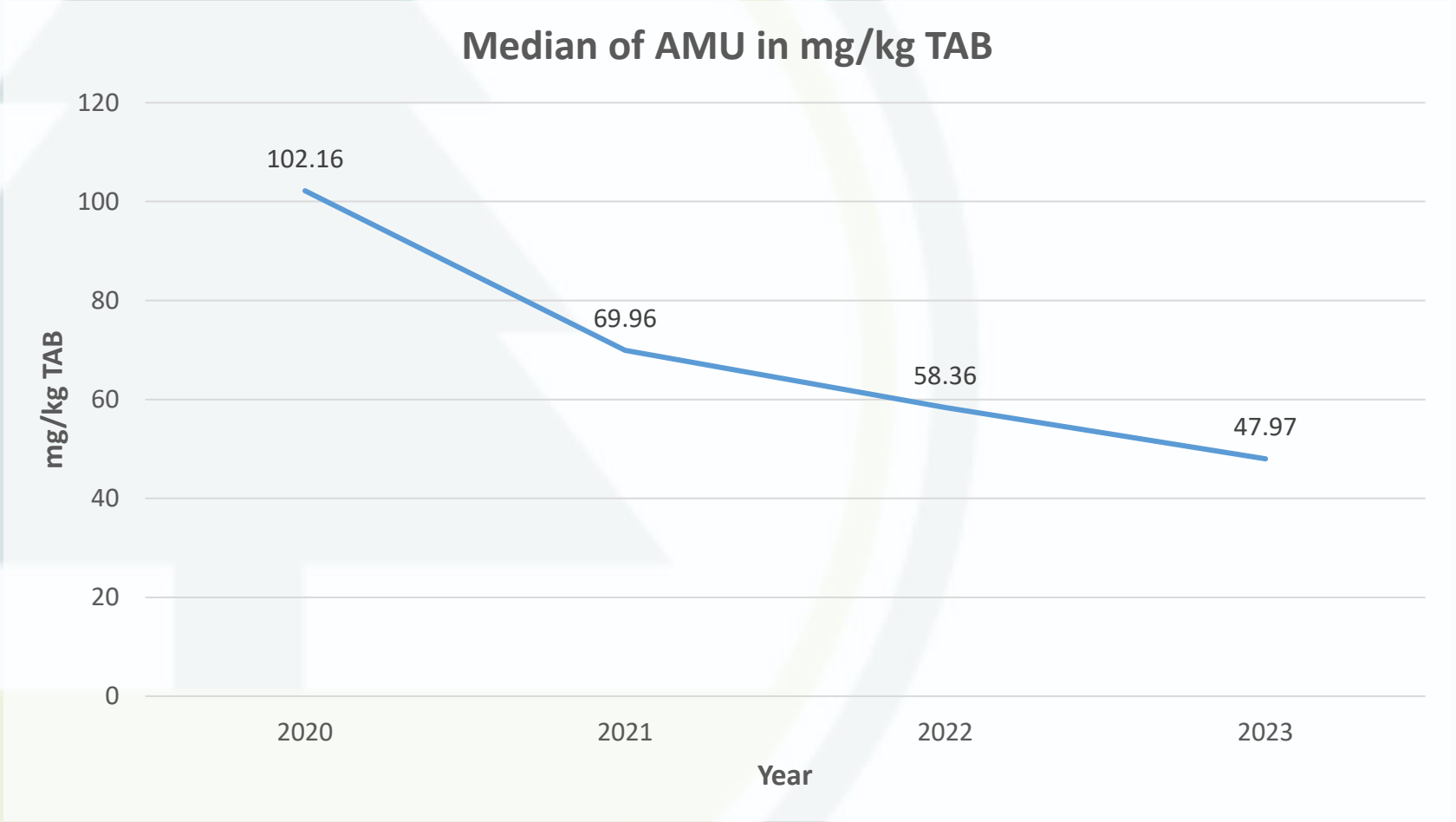
Time Period	2020	2021	2022	2023	2024
Monthly average AMU reporting rate	76%	86%	88.7%	85.1%	85.5%
Number of farmers reporting AMU at least once in the year	38/43	39/43	40/43	39/43	37/43
Calculated total quantity of AMU in kg	1933.04	1582.60	1871.54	1575.52	1209.43
AMU in mg/kg TAB	123.72	105.56	113.18	101.94	109.86
Rolling average of AMU in mg/kg TAB over the past 3 years	-	113.49	114.15	106.89	108.33
Median of AMU in mg/kg TAB	102.16	69.96	58.36	47.97	-

- **Statistical decreasing trend detected in the median of AMU in mg/kg TAB** from 2020 to 2023 with ***p*-value of 0.089** using Mann-Kendall Trend test
- **Significant decrease in median of AMU in mg/kg TAB** when comparing AMU in **2020 to 2023** with ***p*-value of 0.025** using Permutation test after removing outlier data detected by Tukey Fence (k=1.5)
- **10 farms were not in operation for the majority of 2024 due to African swine fever outbreaks**
- Usage of 3rd and 4th generation cephalosporins (mg/kg TAB) decreased from 2023
- Quinolone usage (mg/kg TAB) also declined in 2024

AMU Surveillance – Pig Farms



AMU Surveillance – Pig Farms



AMU Surveillance – Chicken Farms

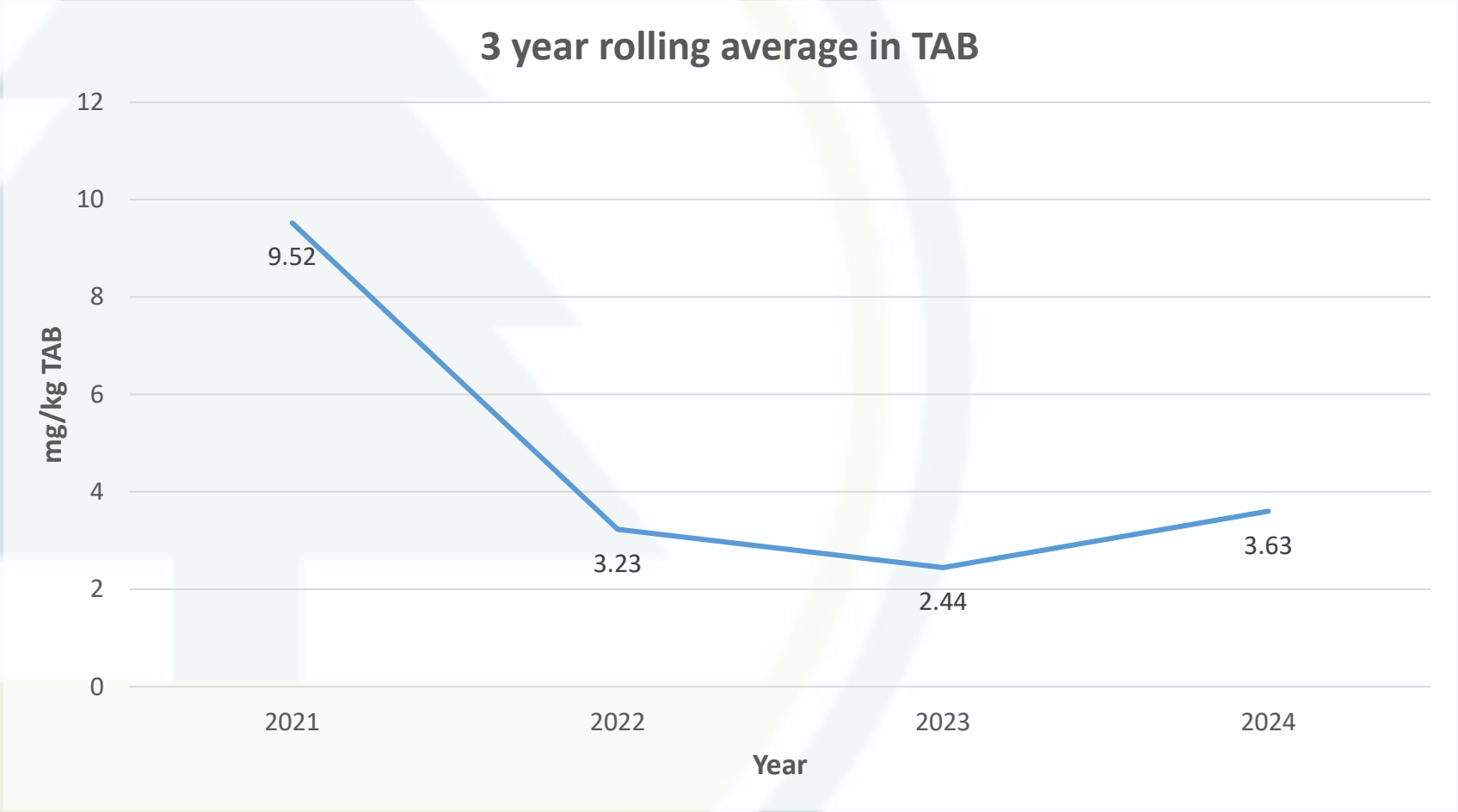
Key results on antimicrobial usage

Time Period	2020	2021	2022	2023	2024
Monthly average AMU reporting rate	90%	93%	91%	93%	93%
Number of farmers reporting AMU at least once in the year	27/29	27/29	27/29	27/29	27/29
Calculated total quantity of AMU in kg	43.40	15.41	11.76	23.51*	36.69*
AMU in mg/kg TAB	5.83	2.10	1.76	3.46*	5.67*
Rolling average of AMU in mg/kg TAB over the past 3 years	-	9.52	3.23	2.44	3.63
Median of AMU in mg/kg TAB	0	0	0	0	0

**The increase in AMU was attributed to the prescription of antimicrobials by the City University ambulatory team for treatment of disease outbreaks in chicken farms.*

- Decreased number of farms using AMs from 11 in 2023 to 7 in 2024
- Decreased number of farms using fluroquinolones from 6 in 2023 to 1 in 2024
- No reported usage of 3rd and 4th generation cephalosporins in the past 4 years
- The highest user is a breeder farm
- AM usage is rare in chicken farming in Hong Kong – slight increases could occur in response to disease outbreaks on a small number of farms

AMU Surveillance – Chicken Farms



AMU Surveillance Summary Findings

Findings of the **first few years** of the surveillance programme:

a. **Chicken producers use less antimicrobials than pig producers** (life span, how animals are reared)
b. Farmers reported **no known use of AMs for growth promotion**
c. **Decreasing trend of AMU** in pig and chickens farms

Antimicrobial resistance (AMR) surveillance

- Surveillance of AMR in commensals (E.coli and Enterococcus)
- Faecal samples (pigs), cloacal swab & faecal samples (chickens)

Antimicrobial Resistance: Key Pathogens of Concern

Prioritization of Antimicrobial-Resistant Pathogens

- In accordance with the **2024 WHO Bacterial Priority Pathogens List**, the following microorganisms represent the **most urgent global threats** due to rising multidrug resistance.

Critical Priority Microorganisms

- Carbapenem-resistant Enterobacterales (CRE) (including *Klebsiella pneumoniae, Escherichia coli*)
- Third-generation cephalosporin-resistant Enterobacterales including Extended-spectrum β-lactamase (ESBL)-producing Enterobacteriaceae

High Priority Microorganisms

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
  - Community-associated (CA-MRSA)
  - Healthcare-associated (HA-MRSA)
  - Livestock-associated (LA-MRSA)
- Vancomycin-resistant Enterococcus (VRE)

Comprehensive Approach to Antimicrobial Resistance (AMR) Surveillance

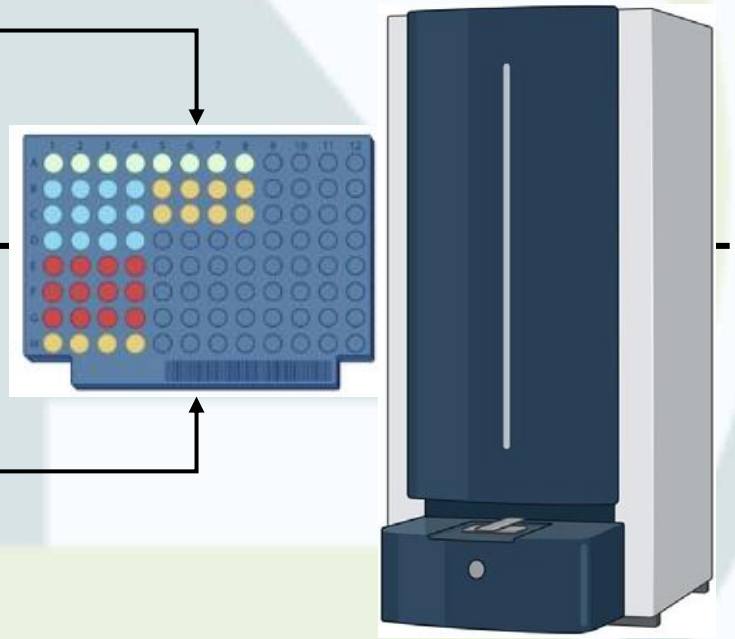
- **Dual Testing Strategies**:
  All isolates undergo phenotypic antimicrobial susceptibility testing (AST), while selected isolates receive detailed genotypic analysis.
- **Key Indicator Organism**:
  Commensal *Escherichia coli* is utilised as the primary indicator for AMR surveillance.
- **Culture Techniques**:
  - *Non-selective culture* assesses the overall prevalence of resistance.
  - *Selective culture* detects low-level carriage of including Extended-spectrum β-lactamase (ESBL)-producing and carbapenem-resistant *E. coli* strains.
- **Antimicrobial Susceptibility Testing (AST):**
  Isolates are tested against a broad panel of antimicrobials, including those critically important for human medicine, to determine minimum inhibitory concentrations (MICs).
  Interpretation follows Clinical and Laboratory Standards Institute (CLSI) guidelines.
- **Genotypic Analysis**:
  Focused on multidrug-resistant *E. coli*, particularly ESBL-R and carbapenem-resistant strains.
  Provides insights into sequence types, resistance genes, and plasmid profiles.

AMR Surveillance – Method

- Currently **TWO** types of medium are used for culturing *E. coli* from faecal/cloacal swab samples
  - **Non-selective** (MacConkey agar) & **Selective** (Brilliance ESBL agar & chromID CARBA SMART agar)

Non-selective agar

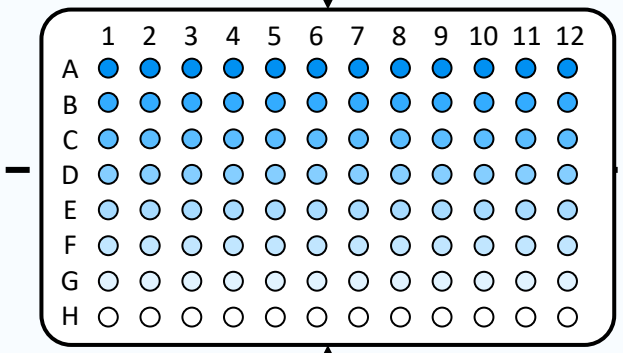
Multiple colonies are picked for isolation of targeted bacteria e.g. *E. coli,* bacteria **identity confirmed via MALDI-ToF**



Selective agar

Non-selective agar

Only ONE isolate identified as targeted bacteria will be **picked for AST via MIC microbroth dilution test**



Selective agar

- Picking multiple colonies during the isolation / identification phase to ensure the targeted bacteria is picked

AMR Surveillance – Method

1. Non-selective media:
   - For **routine AMR monitoring/surveillance**; allows growth and isolation of **commensal *E. coli*** in samples
   - Provides information of the **overall AMR profile / prevalence of bacterial population** of samples
2. Selective media:
   - Allow **detection of specific AMR (ESBL, AmpC, CRE) *E. coli* even at low level** in samples by suppressing commensal *E. coli* growth

- Use of non-selective media was employed/recommended by other leading countries/organisations in farm animal AMR surveillance, allowing international data comparison

Organisation / Country	Year	Use of / Suggested use of		References
		Non-selective media	Selective media	
FAO	2019	✓		https://openknowledge.fao.org/server/api/core/bitstreams/f31e70b6-b9e0-41b6-916a-1cb0c3654c4d/content
Canada CIPARS	2019	✓		https://publications.gc.ca/collections/collection_2023/aspc-phac/HP2-4-2019-3-eng.pdf
UK VARSS	2023	✓	✓	https://assets.publishing.service.gov.uk/media/6718c19fe319b91ef09e38b6/2881449-v2-VARSS_2022_Report_v3__October_2024_Update_.pdf
EFSA	2023	✓	✓	https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/sp.efsa.2023.EN-7826

AMR Surveillance – Method

- **ECDC, EFSA and EMA** have jointly established a list of outcome indicators for assessing progress in reducing AMU and AMR in food-producing animals in 2017 stated:
  1. **Primary summary indicator** consists of proportion of **indicator *E. coli* that are fully susceptible** to tested panel of antimicrobials; hence require the use of **non-selective media**
  2. **Secondary summary indicator** consists of the proportion of **samples that are positive of ESBL-/AmpC-producing indicator *E. coli***; hence require the use of **selective media**

  https://www.efsa.europa.eu/en/efsajournal/pub/5017

- The **UK VARSS 2022 report** commented on the use of selective media to specifically isolate ESBL-/AmpC-producing indicator *E. coli* with the following quote:

  "Therefore, these selective methods are **not able to quantify the risk** which these bacteria may potentially pose to human or animal health"

  https://assets.publishing.service.gov.uk/media/6718c19fe319b91ef09e38b6/2881449-v2-VARSS_2022_Report_v3__October_2024_Update_.pdf

- **Both non-selective and selective media should be used for AMR surveillance** : non-selective media (commensal *E. coli*) provides an overall assessment of AMR in farms and allow general public health risk assessment; selective media (specific AMR *E. coli*) allows in-depth understanding and specific monitoring of certain AMR (phenotypic and genotypic) with limited value on public health risk assessment alone

Antimicrobial resistance (AMR) surveillance

Chicken Farms

- **Cloacal swabs** collected from individual market-weight chickens, prioritising different houses or distant cages
- **Environmental drag swabs** taken from areas near cloacal sampling sites

Pig Farms

- **Fresh faecal samples** (~10g) collected from individual market-weight pigs
- Samples taken from randomly selected sheds or barns

AMR Surveillance – Pig Farms

Number of samples positive for resistant bacteria cultured

Time Period	2020		2021		2022		2023		2024 (Jan-Jun)	
No. of Sample[1] Collected	152		204		195		186		90	
Culture media [non-selective (non-S)/selective (S)[2]]	Non-S	S	Non-S	S	Non-S	S	Non-S	S	Non-S	S
No. of sample positive for suspected extended spectrum beta-lactamase (ESBL)-producing[3] *E coli*	4 (2.6%)	120 (78.9%)	4 (2.0%)	187 (91.7%)	6 (3.1%)	169 (86.7%)	8 (4.3%)	170 (91.4%)	2 (2.2%)	78 (86.7%)
No. of samples positive for carbapenem-resistant[4] *E coli*	0 (0%)	2 (1.3%)	0 (0%)	3 (1.5%)	1 (0.5%)	4 (2.1%)	0 (0%)	10 (5.3%)	0 (0%)	8 (8.9%)
No. of samples positive for vancomycin-resistant Enterococcus (VRE)[5]	-	0 (0%)	-	0 (0%)	-	0 (0%)	-	0 (0%)	-	0 (0%)

[1]Samples collected were faecal samples.
[2]Selective media used are media containing antimicrobial agents intended for detection of specific AMR (ESBL, CRE).
[3]Suspected ESBL is determined by ceftiofur resistance (3rd generation cephalosporin).
[4]Carbapenem-resistance is determined by meropenem resistance.
[5]Culturing of Enterococcus was performed using enrichment medium.

AMR Surveillance – Chicken Farms

Number of samples positive for resistant bacteria cultured

Time Period	2020		2021		2022		2023		2024 (Jan-Jun)	
No. of Sample[1] Collected	61		207		195		189		78	
Culture media [non-selective (non-S)/selective (S)[2]]	Non-S	S	Non-S	S	Non-S	S	Non-S	S	Non-S	S
No. of sample positive for suspected extended spectrum beta-lactamase (ESBL)-producing[3] *E coli*	9 (14.8%)	47 (77.0%)	50 (24.2%)	170 (82.1%)	38 (19.5%)	144 (73.8%)	34 (18.0%)	149 (78.8%)	18 (23.1%)	63 (80.8%)
No. of samples positive for carbapenem-resistant[4] *E coli*	0 (0%)	1 (1.6%)	0 (0%)	7 (3.4%)	0 (0%)	5 (2.6%)	0 (0%)	1 (0.5%)	0 (0%)	0 (0%)
No. of samples positive for vancomycin-resistant Enterococcus (VRE)[5]	-	0 (0%)	-	0 (0%)	-	0 (0%)	-	0 (0%)	-	0 (0%)

[1]Samples collected were cloacal swabs and environmental drag samples.
[2]Selective media used are media containing antimicrobial agents intended for detection of specific AMR (ESBL, CRE).
[3]Suspected ESBL is determined by ceftiofur resistance (3rd generation cephalosporin).
[4]Carbapenem-resistance is determined by meropenem resistance.
[5]Culturing of Enterococcus was performed using enrichment medium.

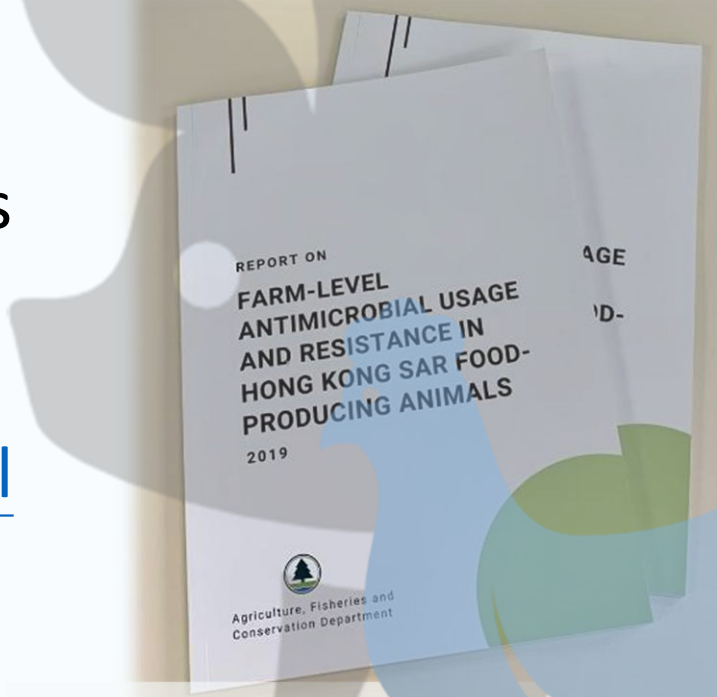
AMR surveillance findings

Findings of the **first few years** of the surveillance programme:

a. **No obvious trend** observed
b. Percentage of **ESBL-E remained relatively stable** & **absence** of **VRE** in both **chicken** and **pig farms**.
c. The **prevalence** of **CRE** in **pig farms accords with findings from across the region**.

Industry report

- A **detailed analysis** of all **2019 AMU & AMR data** from pig, chicken and fish farms were included in the **industry report**, which also includes the results of **genetic sequencing** of some selected resistant bacteria
- https://www.afcd.gov.hk/english/quarantine/qua_live/qua_live_amr/files/2019AMU-AMR-FullReportFINALv2.pdf



Industry report

- **Whole genome sequencing (WGS) findings**
  - Selected resistant bacterial isolates were subjected to WGS
  - Isolates were **selected based on MIC results** (e.g. resistance to 3rd generation cephalosporins, multidrug resistant strains, resistance to colistin, carbapenems etc.)
  - For ***E. coli*** and **Salmonella**, there was **generally good correlation between phenotypic and genotypic resistance** results
  - Most of the resistance genes appeared to be carried on **plasmids**
  - Identification of globally important **multi-drug resistant strains of bacteria** (e.g. *E. coli* ST648, monophasic Salmonella 1,4,[5],12 i;-) – resistance for these is **unlikely to be generated on local farms**

	Strain 1 ST410 O115:H28	Strain 2 ST1674 O11:H25	Strain 3 ST10 O27:H12	Strain 4 ST502 O86:H11 (Haemolytic)	Comment
Aminoglycoside	*aac(3)-IV* *aadA2* *aph(3')-Ia* *aph(3'')-Ib* *aph(4)-Ia* *aph(6)-Id*	*aadA2* *aph(3'')-Ib* *aph(6)-Id*	*aac(3)-IId* *aadA1* *aph(3')-Ia* *aph(3'')-Ib* *aph(6)-Id*	*aadA1* *aadA2* *ant(2'')-Ia* *aph(3')-Ia*	
Beta-lactam	$bla_{CTX-M-65}$ bla_{TEM-1B}	bla_{TEM-1A}	bla_{TEM-1B}	bla_{CMY-4}	
Colistin				*mcr-1.1*	Colistin gene chromosomal
Fluoroquinolone	*qnrS1* *gyrA* S83L D87N *parC* S80I *parE* S458A	*qnrS1*	*oqxA* *oqxB* *gyrA* S83L D87N *parC* S57T S80I	*oqxB* *gyrA* S83L D87N *parC* S57T S80I	
Macrolide, lincosamide, streptogramin B	*lnu(F)*		*mph(A)*		
Phenicols	*floR*	*floR*	*floR*	*catA1* *cmlA1*	
Sulphonamide, trimethoprim	*sul2* *dfrA17*	*sul2* *sul3* *dfrA12*	*sul1* *sul2* *dfrA1*	*sul3* *dfrA12*	
Tetracycline	*tet(B)* *tet(M)*	*tet(A)*	*tet(A)*	*tet(A)*	
Resistance genes – number of AM classes	*8*	*7*	*8*	*8*	

Other Study 1: Investigate ESBL-producing (ESBL-) *E. coli* occurrence in local chicken farms

- Aim to study **ESBL-*E. coli* prevalence in locally raised chicken**, from hatching till market-ready; faecal/cloacal samples and environmental samples were collected from each of two local chicken farms at different day.
- **No carbapenem resistant *E. coli* (CRE)** was identified.
- Result indicates **day-old chicks are negative for ESBL-*E. coli*** up till reaching local farms; **local farms' environment is positive for ESBL-*E. coli***; suggesting the **environment might serve as ESBL-*E. coli* reservoir**.

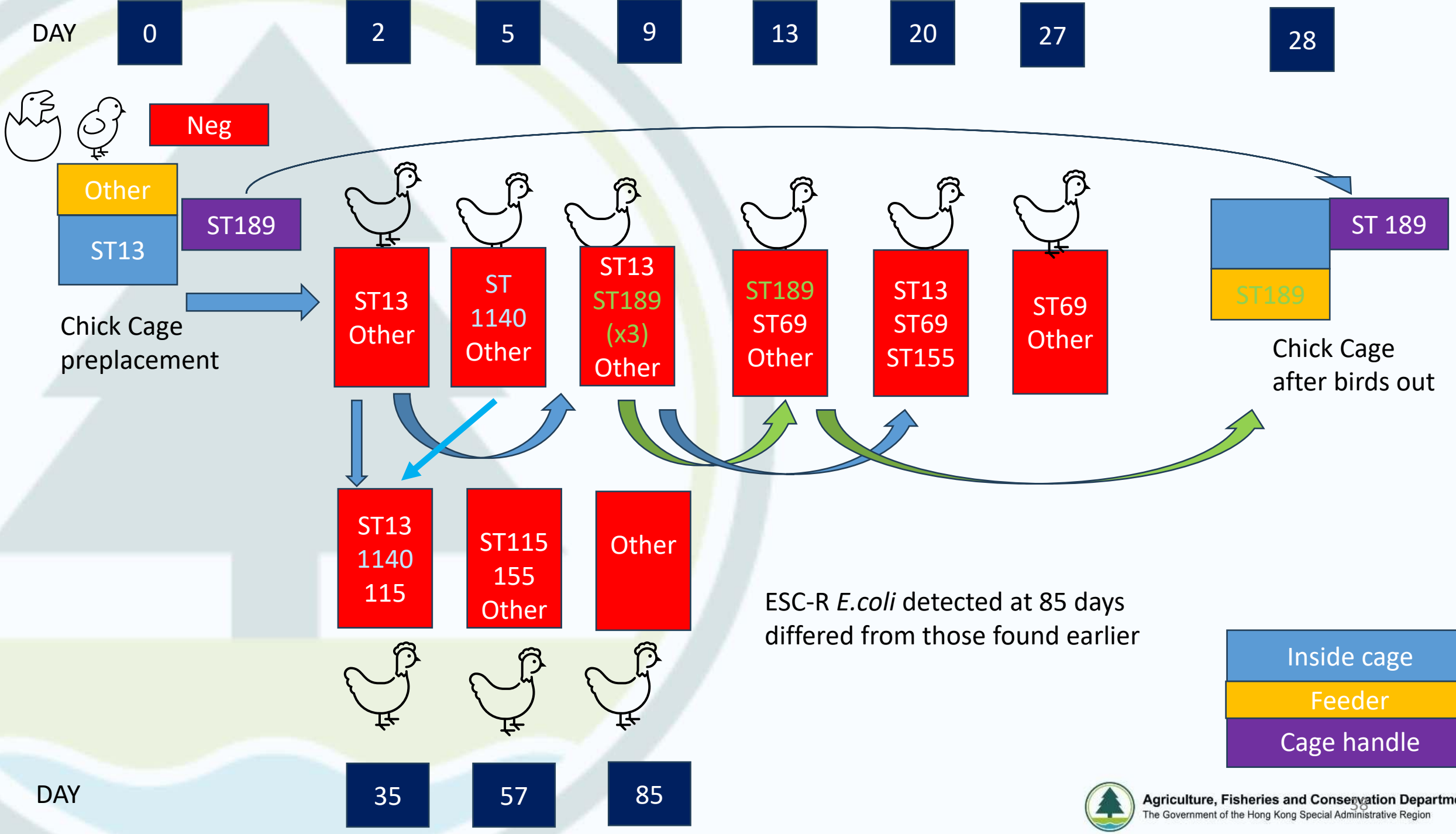
Suspected ESBL-producing *E. coli* isolated from faecal/cloacal samples, using selective agar[1]

Day	0	2	5	9	13	20	27	35	58	85
Farm M01	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Day	0	2	5	9	12	19	25	33	54	80
Farm M03	No	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

Suspected ESBL-producing *E. coli* isolated from environmental samples, using selective agar[1]

	Small cage		**Medium Cage**		**Large Cage**	
	Pre-use	Post-use	Pre-use	Post-use	Pre-use	Post-use
Farm M01	**YES**	**YES**	**YES**	No	No	No
Farm M03	**YES**	**YES**	No	No	No	No

[1]Selective media used are media containing antimicrobial agents intended for detection of specific AMR (ESBL, CRE)


DAY
0
2
5
9
13
20
27
28
Neg
Other
ST13
ST189
Chick Cage preplacement
ST13 Other
ST 1140 Other
ST13 ST189 (x3) Other
ST189 ST69 Other
ST13 ST69 ST155
ST69 Other
ST 189
ST189
Chick Cage after birds out
ST13 1140 115
ST115 155 Other
Other
ESC-R *E.coli* detected at 85 days differed from those found earlier
Inside cage
Feeder
Cage handle
DAY
35
57
85

Other Study 2: Investigate ESBL- *E. coli* occurrence in feeds and water in local chicken farms

- Aim to investigate **occurrence of ESBL- and carbapenemase-producing *E. coli* in poultry feed and water**
- A total of 35 feed samples and 20 water samples were collected from 7 farms, selective agar[1] was used to isolate the ESBL- and carbapenemase-producing *E. coli*
- **1 feed sample** was positive for carbapenem resistant *E. coli* (CRE)

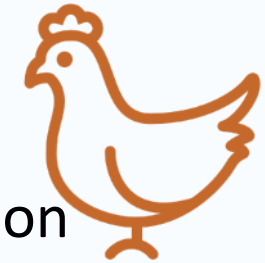
Sample type	Status	Source	No. of sample	No. of sample positive for ESBL-*E. coli* (n, %)	No. of sample positive for CRE (n, %)
Chicken feed	New	Unopened bag	15	1 (6.67%)	0 (0%)
		Feed mixer	3	1 (33.33%)	0 (0%)
	In-use	Feeding trough	14	13 (92.86%)	**1 (7.14%)**
		Feed trolley	2	1 (50%)	0 (0%)
		Opened bag	1	0 (0%)	0 (0%)
Water	Origin	Faucet	4	0 (0%)	0 (0%)
		well	2	2 (100%)	0 (0%)
		tank	1	0 (0%)	0 (0%)
	In-use	Water feeder	13	4 (30.8%)	0 (0%)

[1]Selective media used are media containing antimicrobial agents intended for detection of specific AMR (ESBL, CRE)

Interventions to gradually reduce levels of ESBL-producing *E. coli* in local food animal farms

- Based on the studies' findings, the following actions has been taken by AFCD:
  - **Conducted** a **survey** in **February 2025** to collect further information on the cleaning and disinfection practices of local chicken farmers
  - **Exploring competitive exclusion using probiotics**, considering that modifying the environment and changing farming practices may prove difficult.

Poultry Farm Cleaning & Disinfection Survey - I



- Questionnaire survey conducted in Q1 2025 to understand cleaning and disinfection (C&D) practice in local poultry farms, **all 28 operating farms participated**
- Some findings include:
  1. **Majority of farms uses commercial disinfectants** recognized by international authorities, with various active ingredients including QACs, glutaraldehyde, potassium peroxymonosulfate etc.
  2. **Some issues on C&D noted on small no. farms**, such as cleaning without the use of cleaning equipment and/or detergent, and insufficient drying time before disinfection
     ***Noteworthy – Knowledge Gap**
     - 1 farm reported not using any disinfectant
     - 1 farm reported misuse of pesticide for disinfection purpose
  3. **No statistically significant difference observed** for particular step of C&D procedure between farms with higher or lower isolation rate of ESBL-*E. coli* using Chi-squared test comparing the number of farms performing certain practice(s) or not

Poultry Farm Cleaning & Disinfection Survey - II

Some findings include (cont'd)

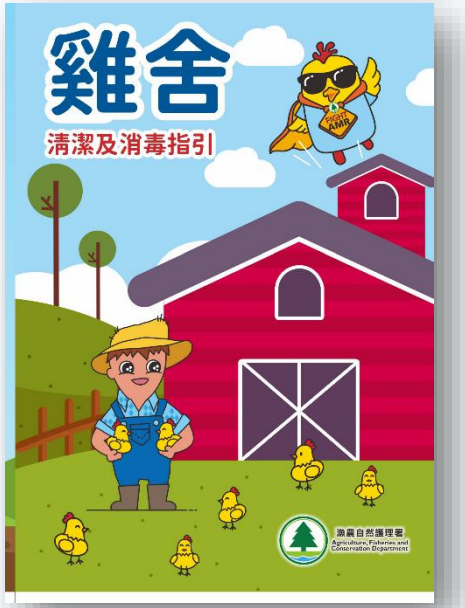
4. **Most** farmers are **aware** of the **importance** of **disinfection** and **use appropriate disinfectants** for C&D

5. Survey result consistent with previous study finding suggesting persistence of **ESBL-*E. coli* due to post-cleaning environmental contamination** in farms

Follow-up Actions:

- **Educational pamphlet** on cleaning and disinfection has been prepared and distributed to farmers in April 2025, explaining the **purposes** and **importance** of each **step**

- **Further communication** has been made with the 2 farmers, who were not using disinfectant or misused pesticide for disinfection, explaining the importance of using effective disinfectant in farm



Exploring Competitive Exclusion using Probiotics

Preparation Stage (First half of 2025)

- **Survey: Conduct survey** on **probiotic usage** in local chicken farms
- **Farm Selection**:
  - **Identify** farms based on **previous ESBL-*E. coli* positive rates**
  - **Consider infrastructure** and **history of using probiotic** of the farms
  - **Assess** farmers' **willingness** to assist with conducting the study and **acceptance** to new probiotic practices
- **Probiotic Selection**:
  - Select appropriate probiotic product with **multiple bacterial strains** known to **modify** the **gut microbiota**.
  - **Powder form** or **premixed with feed**.
  - **Evaluate** both **overseas** and **local suppliers**, ensuring **ease of communication, purchase**, and **delivery** for farmers' use.

Trial (second half of 2025)

- **Probiotic use in local chicken farm study:** **The study is underway**

Key Area 2:
Optimize use of antimicrobials in animals

Phased withdrawal of Antibiotics Permit

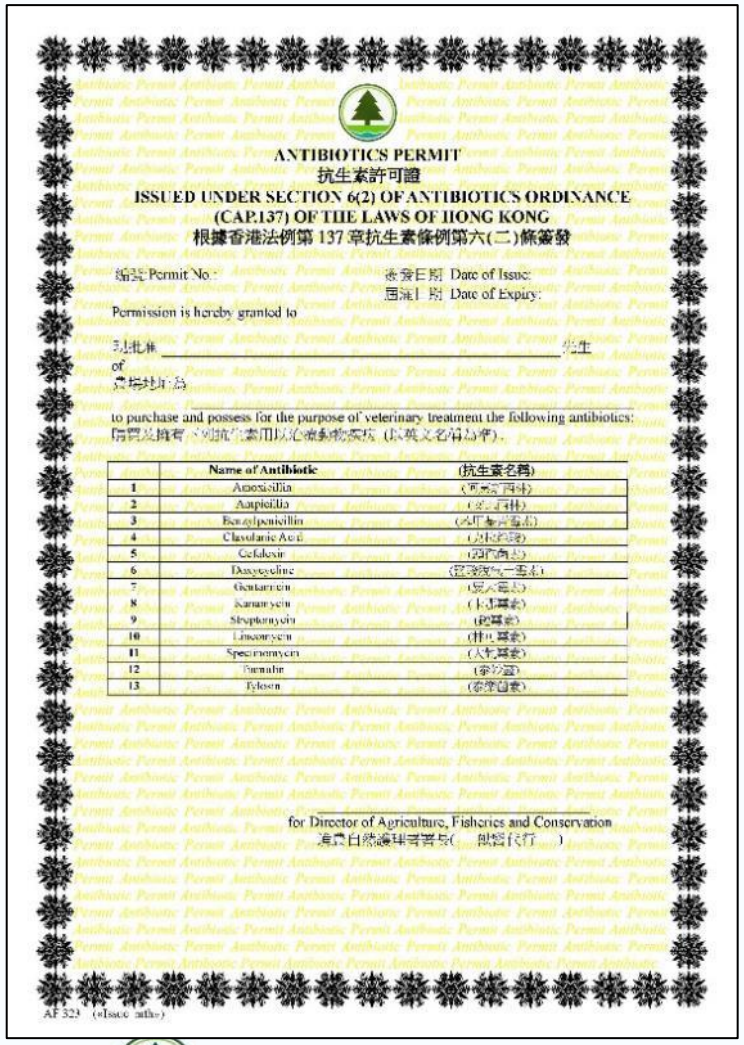
- **AFCD commenced phased withdrawal of Antibiotics Permit issued to livestock farmers since Oct 2020**. AFCD has **ceased issuing** the **Permit** with **effect** from **1st January 2025**.

Codes of Practice (COP)

- To raise awareness and improve knowledge on the proper use of antimicrobials for food animal producers, AFCD has **published and distributed three sets of Codes of Practice (COP)** on the proper use of antimicrobials for distribution to **pig, chicken** and **fish farmers** respectively in 2021. A **revised edition** of **COPs was compiled in 2025**.

Further intervention to Optimize AMU
Veterinary Prescription-only Medication Supply

- AFCD has been issuing **Antibiotic Permit** for local chicken and pig farmers to purchase antibiotics as needed
- In **October 2020**, with City University's provision of veterinary services and drugs to farmers, AFCD commenced **phased withdrawal of Antibiotic Permit** removing **8 antibiotics** at that time
- In **July 2022**, **6 additional antibiotics** were removed from the Permit
- The **remaining 13 antibiotics were removed by end of 2024** to cease the issuance of Antibiotic Permit from 2025 onwards
- Since 1st January 2025, AFCD stops issuance of Antibiotic Permit and implements **"veterinary prescription-only medication supply" policy**, antimicrobials could only be administered to food animals by farmers with prescription from registered veterinary surgeons


ANTIBIOTICS PERMIT
抗生素許可證
ISSUED UNDER SECTION 6(2) OF ANTIBIOTICS ORDINANCE
(CAP.137) OF THE LAWS OF HONG KONG
根據香港法例第 137 章抗生素條例第六(二)條簽發

Permit No.:
Date of Issue:
Date of Expiry:

Permission is hereby granted to

of

to purchase and possess for the purpose of veterinary treatment the following antibiotics:

	Name of Antibiotic	(抗生素名稱)
1	Amoxicillin	
2	Ampicillin	
3	Benzylpenicillin	
4	Clavulanic Acid	
5	Cefalexin	
6	Doxycycline	
7	Gentamycin	
8	Kanamycin	
9	Streptomycin	
10	Lincomycin	
11	Spectinomycin	
12	Tiamulin	
13	Tylosin	

for Director of Agriculture, Fisheries and Conservation

AF 323 (Issue mthe)

Agriculture, Fisheries and Conservation Department
The Government of the Hong Kong Special Administrative Region

Key Area 3:
Reduce incidence of infection through effective sanitation, hygiene & preventive measures

Conducting farm visits to educate farmers on concept of minimising AMU through disease prevention by good farming / aquaculture practices and enhanced biosecurity measures	• AFCD **conducts** roughly **2,900 inspections** of **livestock farms** **each year** , using these visits to **educate farmers** on **AMR** and the **prudent use of antimicrobials**, as well as on **overall farm hygiene**.
Provision of veterinary services to local farms by non-government veterinary sector	• Under **Sustainable Agricultural Development Fund**, projects are run by **City University of Hong Kong** for **pig** and **chicken farms** respectively. • These projects involve formulation of **tailor-made farm-specific disease management plans** for **disease prevention** and **promoting responsible** and **prudent use** of **antimicrobials**, and **assisting farmers in sourcing vaccines and other veterinary medications**.

Key Area 4:
Improve awareness and understanding of antimicrobial resistance through effective communication, education and training (1)

Educational seminar for farmers

- **Educational seminars** for **farmers** on the **prudent** and **responsible use of antimicrobials** are **held annually**.

Webinar for private veterinarians

Two webinars were held in **2021** and **2023** for **private veterinary practitioners**.

Key Area 4:
Improve awareness and understanding of antimicrobial resistance through effective communication, education and training (2)

Knowledge, Attitude and Practice(KAP) surveys

- **Four KAP surveys** were conducted on **local livestock farmers since 2018** and the **latest** one was carried out in **2023.** The **fifth survey** is **scheduled** for **2026**.
- In light of the **survey findings**, **seminars** have been/would be **convened** to **address** the **gaps** identified.

Raise awareness via social media

Series of 4 episodes of **animation** about the **AFCD**'s role **in implementing control measures** within the **veterinary sector** to **combat AMR**.

- Fight AMR team - Episode 01 (English subtitle) https://youtu.be/0h2INjaf4vo
- Fight AMR team - Episode 02 (English subtitle) https://youtu.be/Xa9oQEWJ4XU
- Fight AMR team - Episode 03 (English subtitle) https://youtu.be/HNFblU14Q_8
- Fight AMR team - Episode 04 (English subtitle) https://youtu.be/CZ4OmESPIQ8

An **animation** to **educate pet owners** to **follow** their **veterinarian's instruction** and **complete** the **full course** of **treatment**.

- Message to pet owners - Let's take action against Antimicrobial Resistance https://youtu.be/yjmAFqNRrAA

Key Area 4:
Improve awareness and understanding of antimicrobial resistance through effective communication, education and training (3)

Joint FB posts (AFCD, Centre for Health Protection, Center for Food Safety) during World AMR Awareness Week (18 to 24 November)

Other ongoing activities

- A series of **roving exhibitions** at **Government Offices** have been arranged. Information about **AMU/AMR** in **veterinary sector (including both livestock** and **small animals)** was delivered.
- **Mascots**, **posters**, **leaflets**, **public transport** advertisement

Thank You!

Q & A