

# Antibiotic Use in Food Animals



## Malaysia Overview

# Antibiotic Use in Food Animals: Malaysia Overview

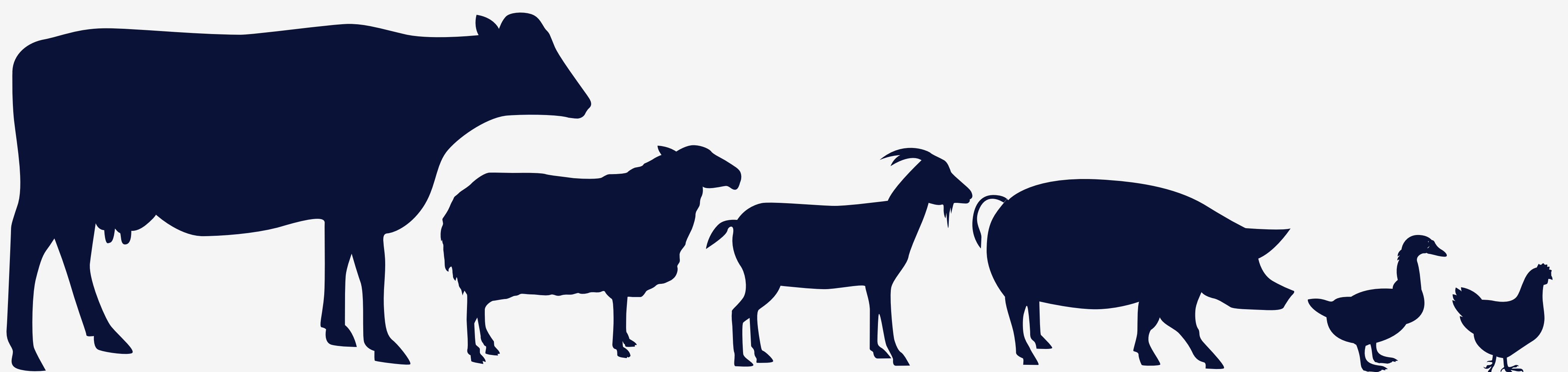
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May 2018

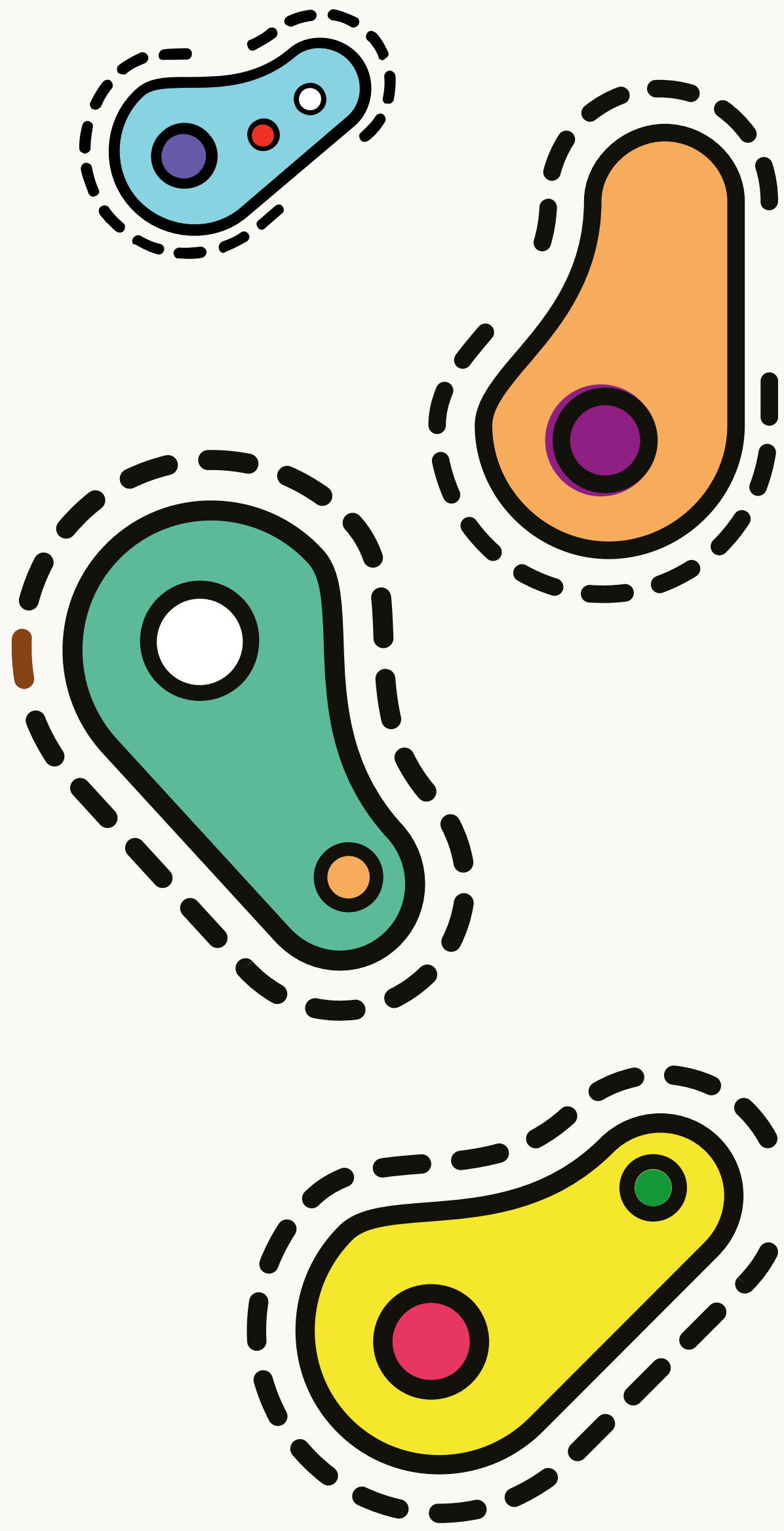
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## What are bacteria?



Bacteria are tiny single-celled organisms, that can be found all over the planet, including soil, water, plants, animals, humans – except places which have been sterilised.

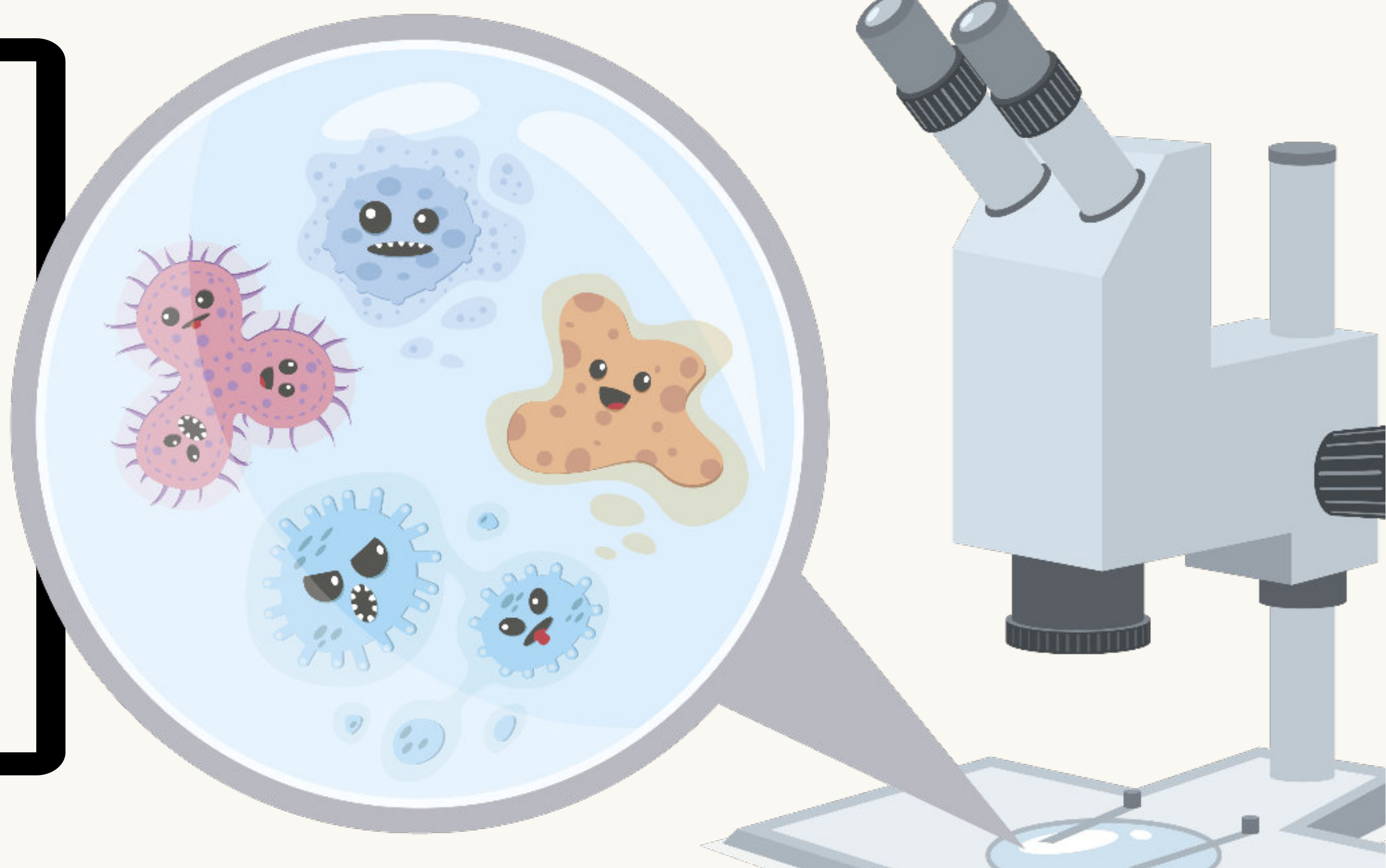
Bacteria are among the most abundant organisms on Earth. The majority of the bacteria play a positive role in nature. They help sustain the existence and continuity of all life forms on our planet.

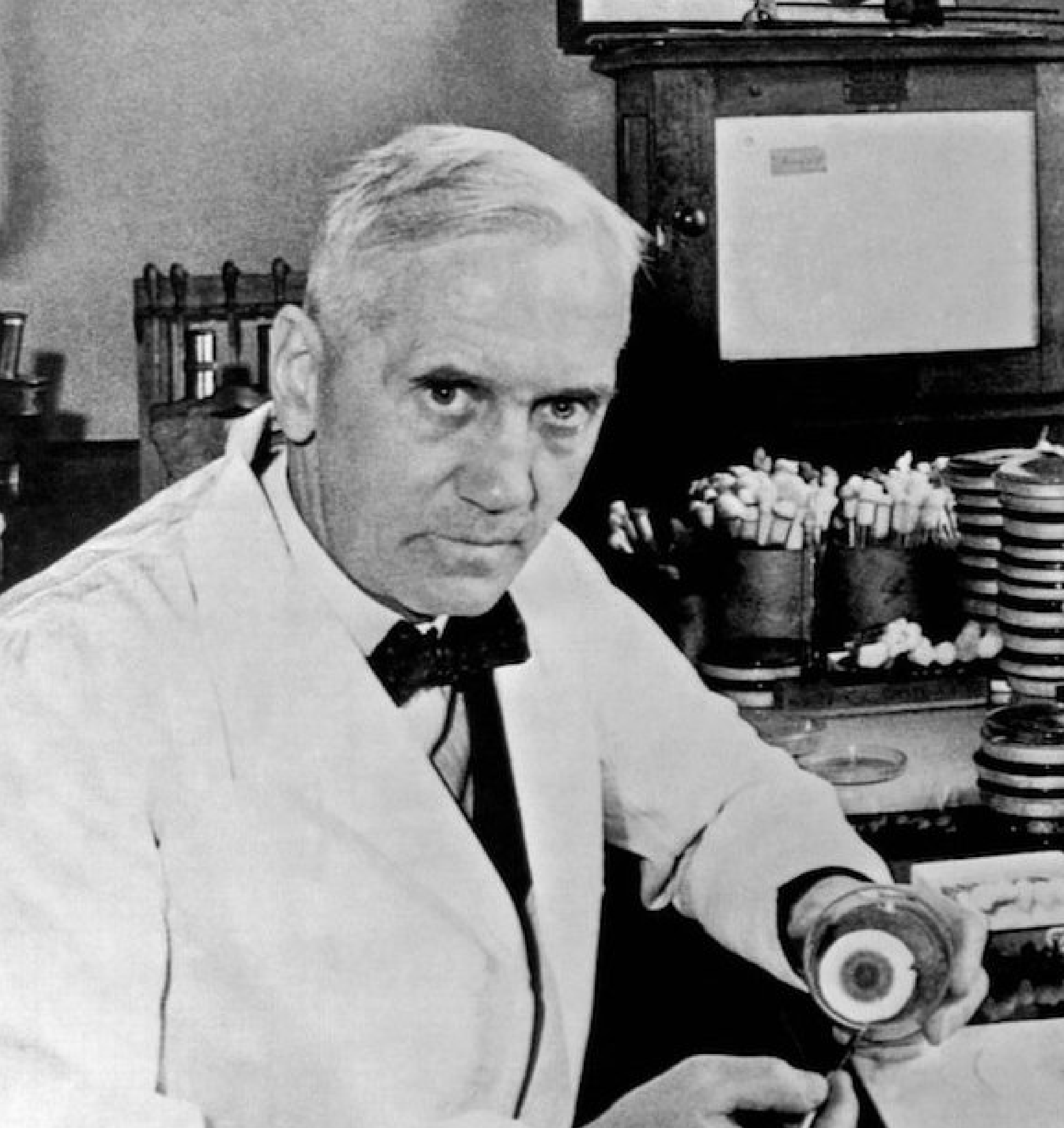
Bacteria decompose and recycle dead animals and plants; digest sewage into simple chemicals; extract nitrogen from the air for plants; and play an essential role in production of food. Scientists and industries also utilise bacteria to produce a lot of useful products.

### What if bacteria enter our bodies...

Nevertheless, not all bacteria are friendly. Pathogenic bacteria cause harm to our bodies. When bacteria manage to get through our first line of defence which is our body's skin and mucous membranes and enter our bodies, they make us sick. For healthy people, the immune system will detect the presence of foreign organisms and activate different types of white blood cells in the bloodstream. Neutrophils engulf and kill the bacteria; Eosinophils and monocytes swallow up the foreign organisms and particles; Basophils help to intensify inflammation to facilitate specialised white blood cells to reach the site of the injury, protecting against a bacterial infection from worsening. However, if the infection happens to people with a weakened immune system, antibiotics have to be introduced to fight the bacteria.

**Bacteria are believed to be the first life forms on Earth, which appeared about 4 billion years ago.**





“When I woke up just after dawn on September 28, 1928, I certainly didn’t plan to revolutionize all medicine by discovering the world’s first antibiotic, or bacteria killer. But I guess that was exactly what I did.”

## Accidental Discovery of the First Antibiotic – Penicillin

In 1928, **Sir Alexander Fleming** was investigating staphylococcus, a type of bacteria that causes boils (infection of hair follicle causing an inflamed pus-filled swelling on the skin). Before he left for vacation, he forgot to place the petri dishes containing staphylococcus culture into the incubator. When he was back in his lab, Fleming noted that a mold called *Penicillium notatum* had contaminated his Petri dishes. After inspecting under a microscope, he was amazed to find that the mold inhibited the normal growth of the staphylococci. He named this active antimicrobial substance "**penicillin**."

## Discovery of Antibiotics?

Antibiotics are agents with biological activities to kill or inhibit the growth of bacteria. Ever since antibiotics were discovered 9 decades ago, they have been used widely in modern medicine and are extremely effective against bacterial infections, which once used to be a major cause of morbidity and mortality.

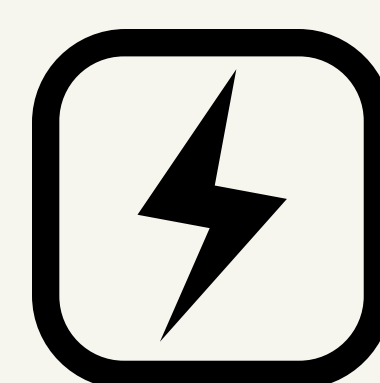
Antibiotics are not only used to treat bacterial infections in humans, but also used to protect the health and welfare of animals.

## Type of Antibiotics



### Bacteriocidal Antibiotics

Antibiotics that **kill bacteria** include aminoglycosides, beta lactams, fluoroquinolones, glycopeptides, lipopeptides, nitroimidazoles and nitrofurans.



### Bacteriostatic Antibiotics

Antibiotics that **inhibit bacterial growth** include glycyliclines, lincosamides, macrolides, oxazolidinones, streptogramins and sulphonamides.

# Antibiotic use in food-producing animals



## What are food-producing animals?

Animals that are raised and bred to produce food for human consumption, such as eggs, meat, milk etc.

Examples: Beef cattle, dairy cattle, goat, sheep, deer, pigs, broiler chicken, layer chicken and ducks

## Why do food-animals need antibiotics?

There are three main reasons why antibiotics are used by farmers:



As **treatment** for animals that show clinical signs of an infectious disease.



As **metaphylaxis** to treat a group of clinically healthy animals and minimise an expected outbreak of a disease or as **prophylaxis** to prevent those at risk from being infected.

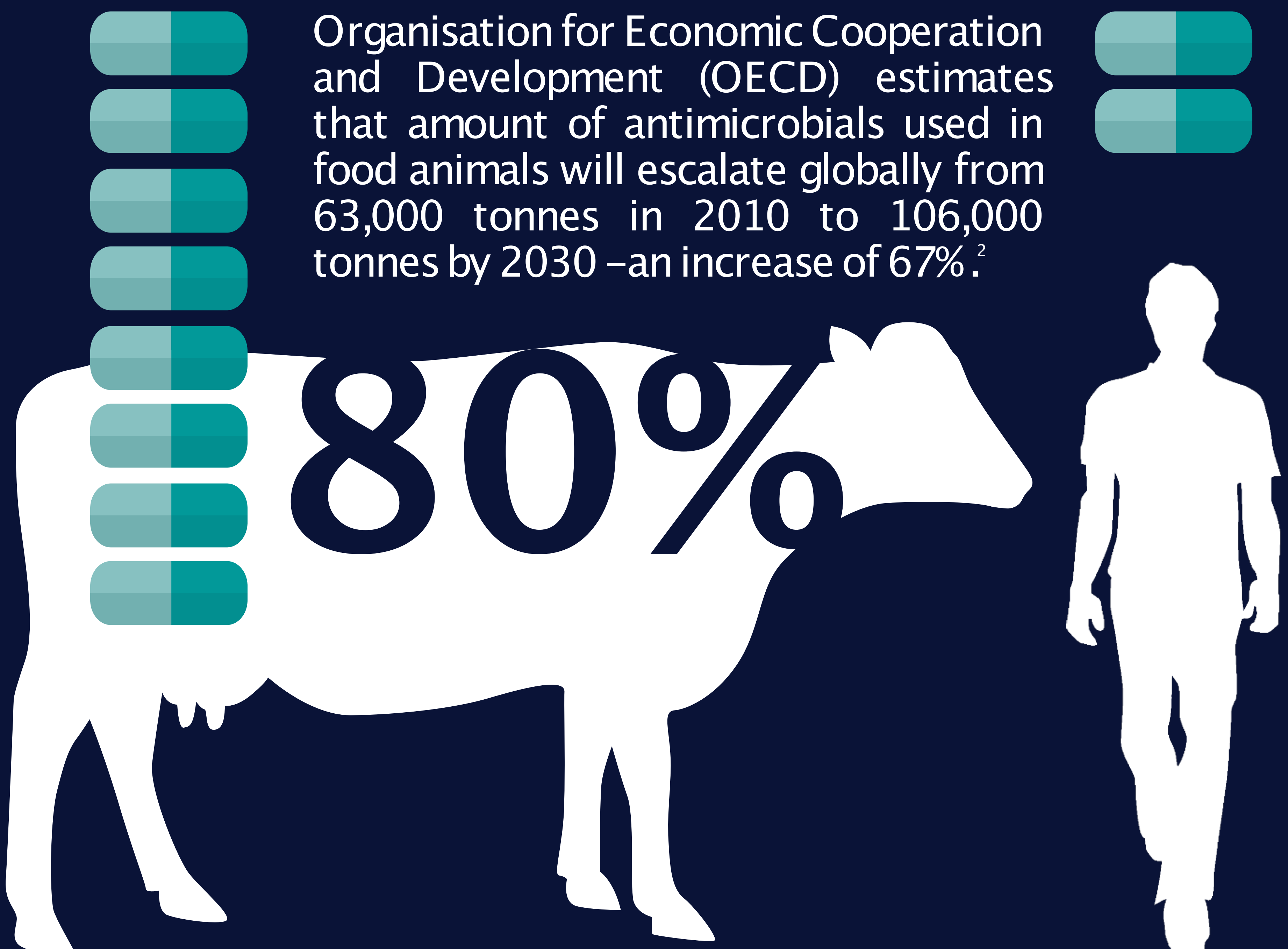


As **growth promoters** to boost weight of animals





## 80% of antimicrobials, by weight, are sold or distributed for use in animals<sup>1</sup>



Reference:

1. Teillant, A., Laxminarayan, R. 2015. "Economics of Antibiotic Use in U.S. Swine and Poultry Production." Choices Quarter 1. Available at <http://choicesmagazine.org/choices-magazine/theme-articles/theme-overview/economics-of-antibiotic-use-in-us-swine-and-poultry-production> (accessed on 28 November 2017)

2. Laxminarayan, R., Van Boeckel, T., Teillant, A. 2015. Global Antimicrobial Use in the Livestock Sector. Organisation for Economic Co-operation and Development. TAD/CA/APM/WP(2014)34/FINAL.

# Livestock in Malaysia

In 2016, the agriculture sector contributed 8.1% or MYR89.5 billion to Malaysia's Gross Domestic Product. Of this, the livestock industry constituted 11.6%, followed by fishing at 11.5%.

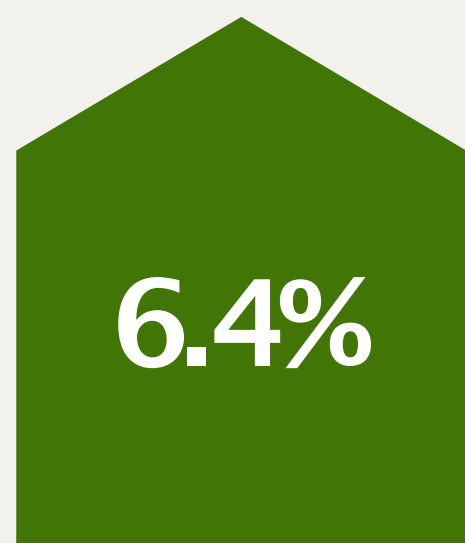
In 2016, the highest number of livestock was chicken at 305.06 million, an increase of 6.4% since 2015. The number of ducks, goat, cattle and buffalo also increased too while swine and sheep decreased.

In 2015, the total number of establishments involved in livestock production was 1,604 with a gross output value of MYR13,312.1 million, constituting 18% of total gross output of the Malaysian agriculture sector. Out of 1,604 establishments, 41.3% (662) were poultry industries, which had a gross output value of RM9,058 million, contributing 68% to the gross output value for the livestock industry.

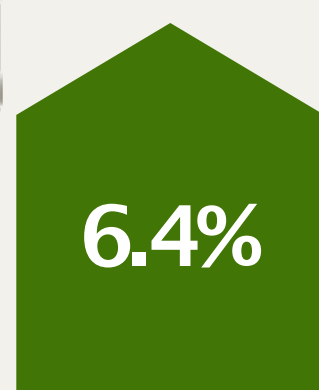


**Chicken**

YEAR 2016  
305,058,206



YEAR 2015  
286,620,834



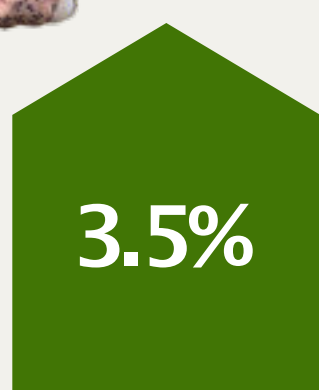
**Duck**

10,655,926 (2016)  
9,897,115 (2015)



**Goat**

446,854 (2016)  
431,651 (2015)



**Cattle**

748,482 (2016)  
742,338 (2015)



**Buffalo**

118,608 (2016)  
118,569 (2015)



**Swine**

1,879,803 (2016)  
1,886,823 (2015)



**Sheep**

145,999 (2016)  
147,033 (2015)

Reference:

1. Department of Statistics Malaysia. Selected Agricultural Indicators, Malaysia, 2017. 22 December 2017. Available at [https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=72&bul\\_id=MDNYUitINmRKcENRY2FvMmR5TWdGdz09&menu\\_id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09](https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=72&bul_id=MDNYUitINmRKcENRY2FvMmR5TWdGdz09&menu_id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09) (accessed on 30 December 2017)
2. Department of Statistics Malaysia. Economic Census 2016 – Livestock. 10 July 2017. Available at [https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=405&bul\\_id=bEkWDRrSWw4OGttVTduamVmWVN5UT09&menu\\_id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09](https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=405&bul_id=bEkWDRrSWw4OGttVTduamVmWVN5UT09&menu_id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09) (accessed on 30 December 2017)



## Fisheries in Malaysia

In 2015, the number of establishments involved in the fisheries was 1,229, while gross output value was MYR2,226.0 million or 3.0% of the total gross output of the agriculture sector.

Fishing on a commercial basis in ocean and coastal waters was a major industry with involvement of 341 establishments, whose gross output in 2015 was MYR680.1 million, an increase of 15.2% per year from MYR335.2 million in 2010.

Reference:

1. Department of Statistics Malaysia. Value added of fisheries sub-sector recorded an annual growth rate of 10.2 per cent in five years period. 7 August 2017. Available at [https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=406&bul\\_id=K3I2eG9kUIVBOEhoOHdITGrW FNIZz09&menu\\_id=Z0VT ZGU1 UHBUT1VJ MFpaXRRR0xpdz09](https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=406&bul_id=K3I2eG9kUIVBOEhoOHdITGrW FNIZz09&menu_id=Z0VT ZGU1 UHBUT1VJ MFpaXRRR0xpdz09) (accessed on 21 December 2017)



# Antibiotic use in livestock in Malaysia

In Malaysia, all antibiotics indicated for disease treatment and metaphylaxis are regulated by National Pharmaceutical Regulatory Agency (NPR A), which is the drug control authority of Malaysia under Ministry of Health (MOH), Malaysia.

Whereas premixes that contain antibiotics for disease prevention and growth promotion are under the control of the Department of Veterinary Services (DVS) under the Ministry of Agriculture in accordance to the Feed Act 2009.

According to the list of registered veterinary products by NPR A, up to November 2017, out of 688 registered veterinary products, there are 458 antibiotics (66.6%) registered for use in livestock.

Group of Drug	Number of products registered
-Aminoglycoside	15
-Amphenicol	44
-β-lactam	45
-Carboxylic	1
-Cephalosporin	13
-Fluoroquinolone	54
-Lincosamide	10
-Macrolide	84
-Orthosomycin	1
-Plueromutilin	16
-Polyether	2
-Polymyxin	31
-Streptogramin	1
-Sulfonamide	12
-Tetracycline	51
-Combination drug containing trimethoprim	43
-Other combination drug of more than 2 antibiotics	35

However some of the registered antibiotics fall under WHO's list of Critically Important Antimicrobials. These antibiotics are identified by WHO as critically important for human health and their use should be restricted in the veterinary sector. These include ampicillin, amoxicillin, cefadroxil, flumequine, sulfadiazine, sulfamethoxine, doxycycline, chlortetracycline, oxytetracycline, erythromycin, gentamycin, neomycin and spiramycin.

Reference:

1. National Pharmaceutical Regulatory Agency, Ministry of Health Malaysia. List of Registered Veterinary Products (Updated November 2017). Available at [http://npra.moh.gov.my/images/reg-info/Veterinary/2017/LIST\\_OF\\_REGISTERED\\_VETERINARY\\_PRODUCTS\\_2017.pdf](http://npra.moh.gov.my/images/reg-info/Veterinary/2017/LIST_OF_REGISTERED_VETERINARY_PRODUCTS_2017.pdf) (accessed on 22 December 2017)

# List of Antibiotics (Premix) Permitted to be Used in Food Producing Animals for Treatment and Disease Prevention/Metaphylaxis

Antibiotic Classes	Species	Disease Treatment	Disease Prevention
<b>Aminoglycosides</b>			
Apramycin	Swine, rabbit	Yes	Yes
Neomycin	Cattle, goat, sheep, swine, poultry	Yes	Yes
Streptomycin	Chicken, calf	Yes	Yes
Spectinomycin	Swine	Yes	Yes
<b>Beta-lactams</b>			
Amoxicillin	Swine, chicken, fish	Yes	Yes
Ampicillin	Cows, swine, chicken	Yes	No
Penicillin G	Chicken, turkey, pheasant, quail, swine	Yes	Yes
<b>Macrolides</b>			
Erythromycin	Poultry, cattle	Yes	Yes
Tilmicosin	Swine, cattle	Yes	Yes
Tylosin	Swine, poultry	Yes	Yes
Tylvalosin	Swine, chicken	Yes	Yes
<b>Polymyxins</b>			
Colistin	Cattle, swine, chicken	Yes	Yes
<b>Sulfonamides</b>			
Sulfadimethoxine	Calf, lamb, goat, rabbit, poultry, swine	Yes	Yes
Sulfamethazine/Sulfadimidine	Calf, lamb, swine	Yes	Yes
Sulfadiazine	Chicken, turkey, horse, swine	Yes	No
Sulfamonomethoxine	Poultry	Yes	No
Sulfamethoxazole	Swine, chicken	Yes	Yes
Sulfathiazole	Swine	Yes	No
<b>Tetracyclines</b>			
Chlortetracycline	Poultry, swine, calf	Yes	Yes
Doxycycline	Swine, chicken	Yes	Yes
Oxytetracycline	Lamb, goat, swine, rabbit, poultry, partridge, salmonid, catfish, lobster, turtle, tortoise	Yes	Yes
<b>Quinolones</b>			
Flumequine	Cattle, sheep, goat, swine, poultry, rabbit, fish	Yes	Yes
<b>Diaminopyrimidines</b>			
Trimethoprim	Swine, chicken, turkey	Yes	Yes
<b>Streptogramins</b>			
Virginiamycin	Swine, chicken	Yes	Yes
<b>Polypeptides</b>			
Bacitracin Methylenedisalicylate	Poultry, swine, cattle	Yes	Yes
Bacitracin Zinc	Poultry, swine, rabbit	Yes	Yes
<b>Lincosamides</b>			
Lincomycin	Chicken, swine	Yes	Yes
<b>Amphenicols</b>			
Florfenicol	Swine, fish	Yes	Yes
<b>Pleuromutilines</b>			
Tiamulin	Swine, chicken, rabbit	Yes	Yes
<b>Orthosomycins</b>			
Avilamycin	Broiler chicken, weaned pig	No	No

The list is not exhaustive

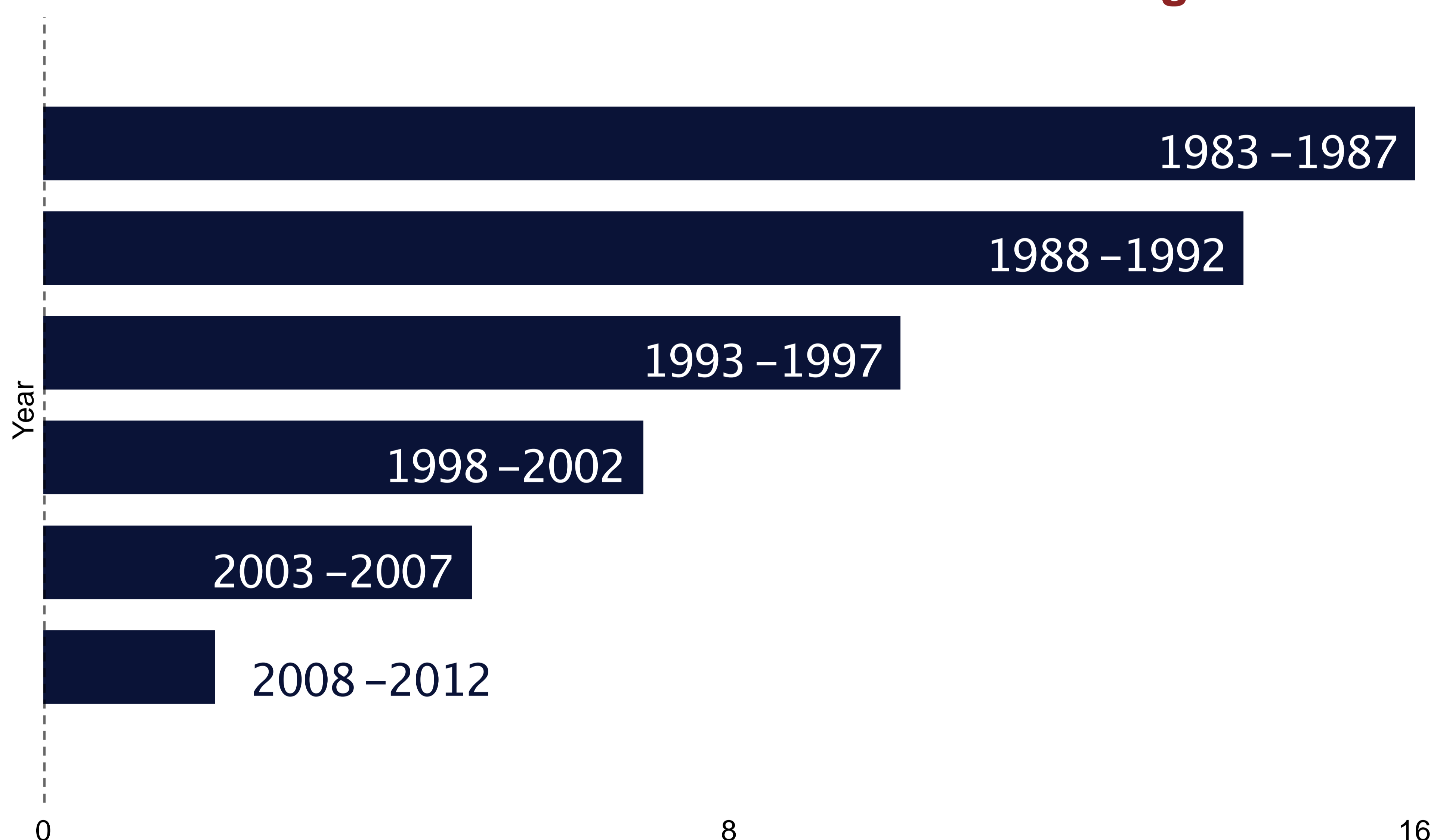
Reference:

1. National Pharmaceutical Regulatory Agency (MPRA). Registration and Regulatory Control of Veterinary Products in Malaysia. ppt. Available at [http://vam.org.my/home/wp-content/uploads/2017/11/Pn-Asnida\\_VMP-Registration-and-Control.pdf](http://vam.org.my/home/wp-content/uploads/2017/11/Pn-Asnida_VMP-Registration-and-Control.pdf). (accessed on 28 December 2017)

# Antibiotics Begin to Fail

The post-World War II period witnessed a 'golden era' of antibiotic discovery. New antimicrobial agents were consistently discovered, developed and marketed from the late 1940s to the early of 1970s. Nevertheless the discovery rate started dwindling 1980s onwards, leaving a discovery void. This is because of an increasingly arduous discovery process and declining interest by companies and government in the research and development of antibiotics due to less promising returns on investment. Around the same time, antibiotic resistance began to emerge due to primarily rampant misuse of antibiotics. Today antibiotic resistance emerges nearly as quickly as the rate at which new antibiotics are developed.

## Total Number of New Antibacterial Agents



Similarly, overuse and inappropriate use of antibiotics in food-producing animals have also given rise to antibiotic resistance in animal pathogens. Antibiotic regimes no longer works on sick animals. Worse still, the resistant bacteria can spread from animals to humans through the food chain.


The emergence of antibiotic resistance progressively undermines the viability of many antibiotics. Resistant bacteria cause thousands of deaths every year. If there is no immediate and radical actions taken collectively against this trend, soon humans will be running out of options to save lives and the world will go back to a pre-antibiotic era.

### Reference:

1. The Epidemic of Antibiotic-Resistance INfections, CID 2008: 46 (15 January) Clin Infect Dis. (2011) May 52 (suppl 5): S397-S428. doi: 10.1093/cid/cir153
2. WHO. Tackling antibiotic resistance from a food safety perspective in Europe, World Health Organisation, Geneva, 2011. 2011.

# Antibiotic Residues in Meat

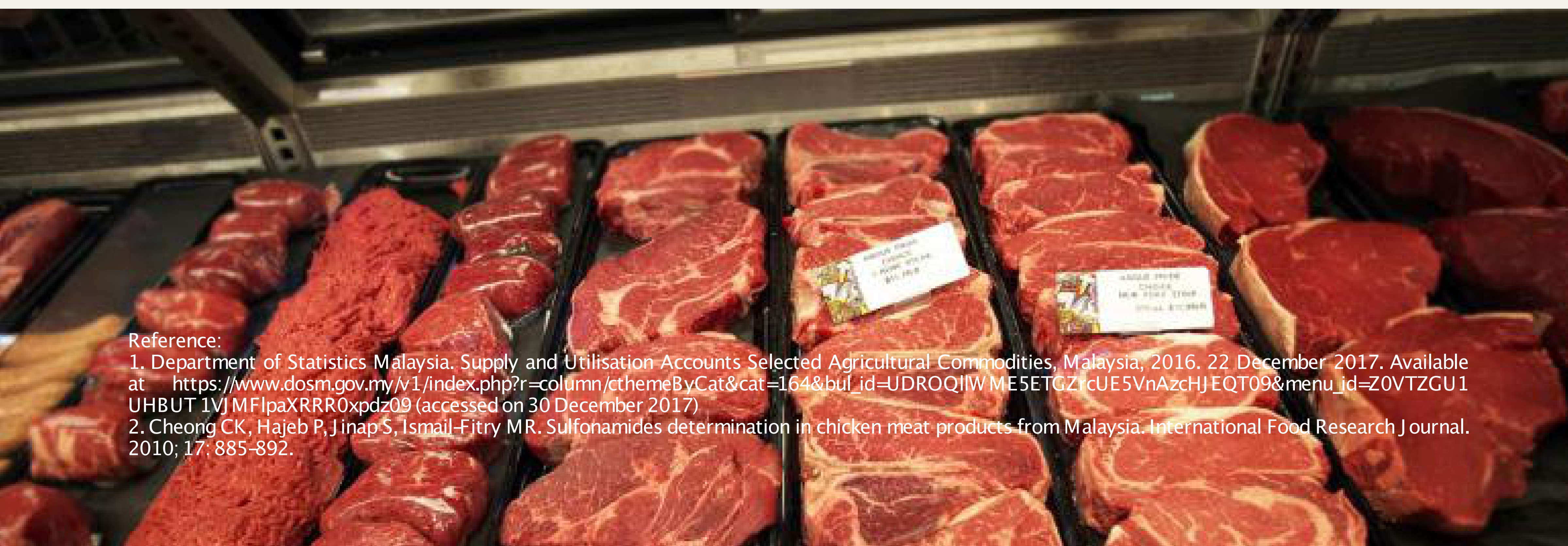
In 2016, the poultry consumption per capita (PCC) in Malaysia stood at 51.2 kilogrammes annually, followed by chicken/duck eggs (21.3 kg/year) and pork (18.7 kg/year).

	Poultry	Chicken/ duck egg	Pork	Beef	Mutton
					
PCC (kg/year)	51.2	21.3	18.7	5.9	1.2

Among 5 selected fishery products, PCC of mackerel fish was the highest at 7.2 kg/year, followed by shrimp (4.1 kg/year), tuna (2.4 kg/year) and cuttlefish (2.3 kg/year). Crab recorded the lowest PCC at 0.4 kg/year only.

When antibiotics are ingested by or injected into the animals, the antibiotic residues will accumulate in the body including in muscle tissues, blood, internal organs, eggs and even fluid like milk. The food-producing animals that are given antibiotics must go through a withdrawal period before the products are sent to the market. The level of antibiotic residue detected in the food products must not exceed the legal permissible level, which is also known as maximum residual level (MRL). Malaysian consumers should have the cognisance of the fact that antibiotic residues may lead to the emergence of antibiotic resistance, which could possibly be transferred to humans and result in treatment failure of clinically significant infections.

A study was conducted in 2010 to determine the level of 4 sulfonamides in chicken breast meat and liver samples marketed in 11 states in Peninsular Malaysia. Out of 66 samples, two samples from Johor were found to be in violation of the official standards for antibiotic residues permitted.



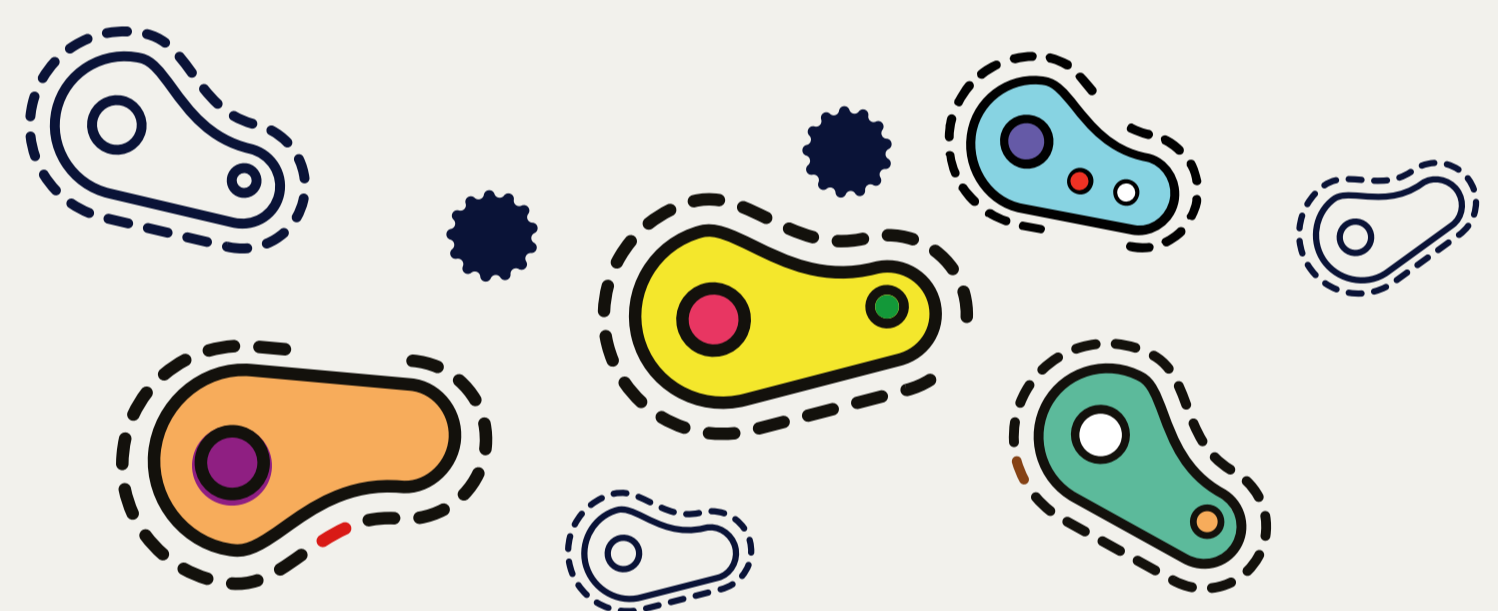
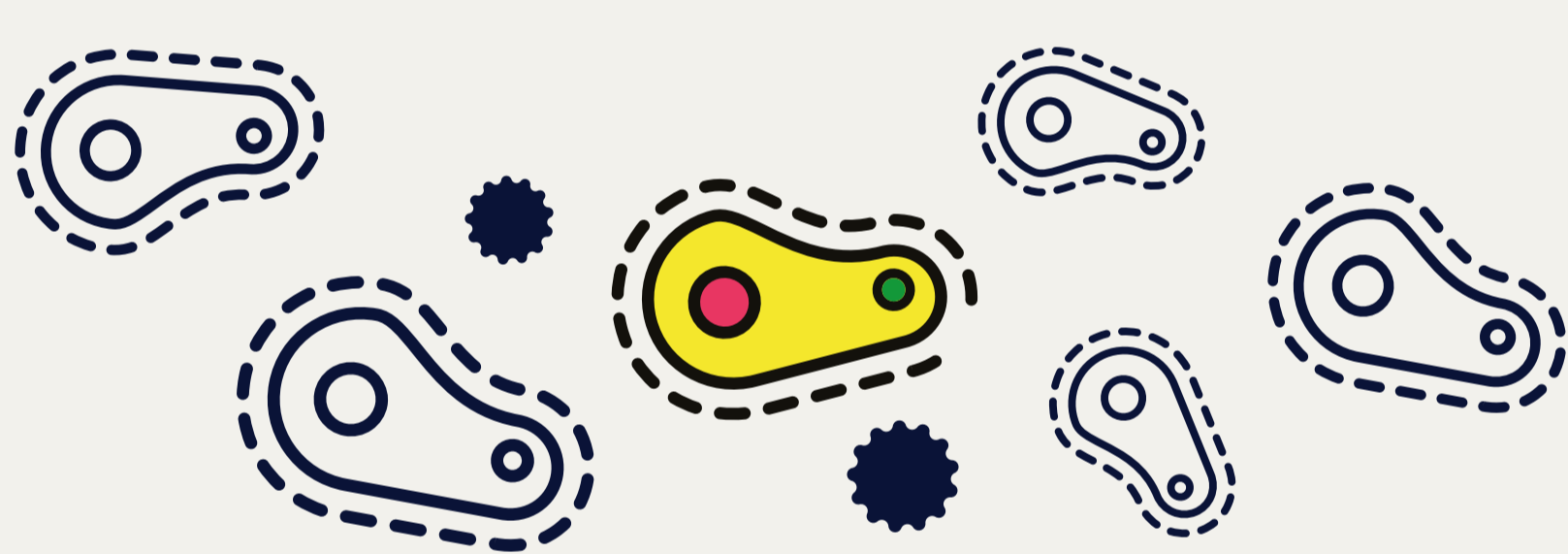
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1. Department of Statistics Malaysia. Supply and Utilisation Accounts Selected Agricultural Commodities, Malaysia, 2016. 22 December 2017. Available at [https://www.dosm.gov.my/v1/index.php?r=column/cthemebycat&cat=164&bul\\_id=JDROQIHWME5ETGZ1cUE5VnAzcHJEQT09&menu\\_id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09](https://www.dosm.gov.my/v1/index.php?r=column/cthemebycat&cat=164&bul_id=JDROQIHWME5ETGZ1cUE5VnAzcHJEQT09&menu_id=Z0VTZGU1UHBUT1VJMF1paXRRR0xpdz09) (accessed on 30 December 2017)
2. Cheong CK, Hajeb P, Jinap S, Ismail-Fitry MR. Sulfonamides determination in chicken meat products from Malaysia. *International Food Research Journal*. 2010; 17: 885-892.



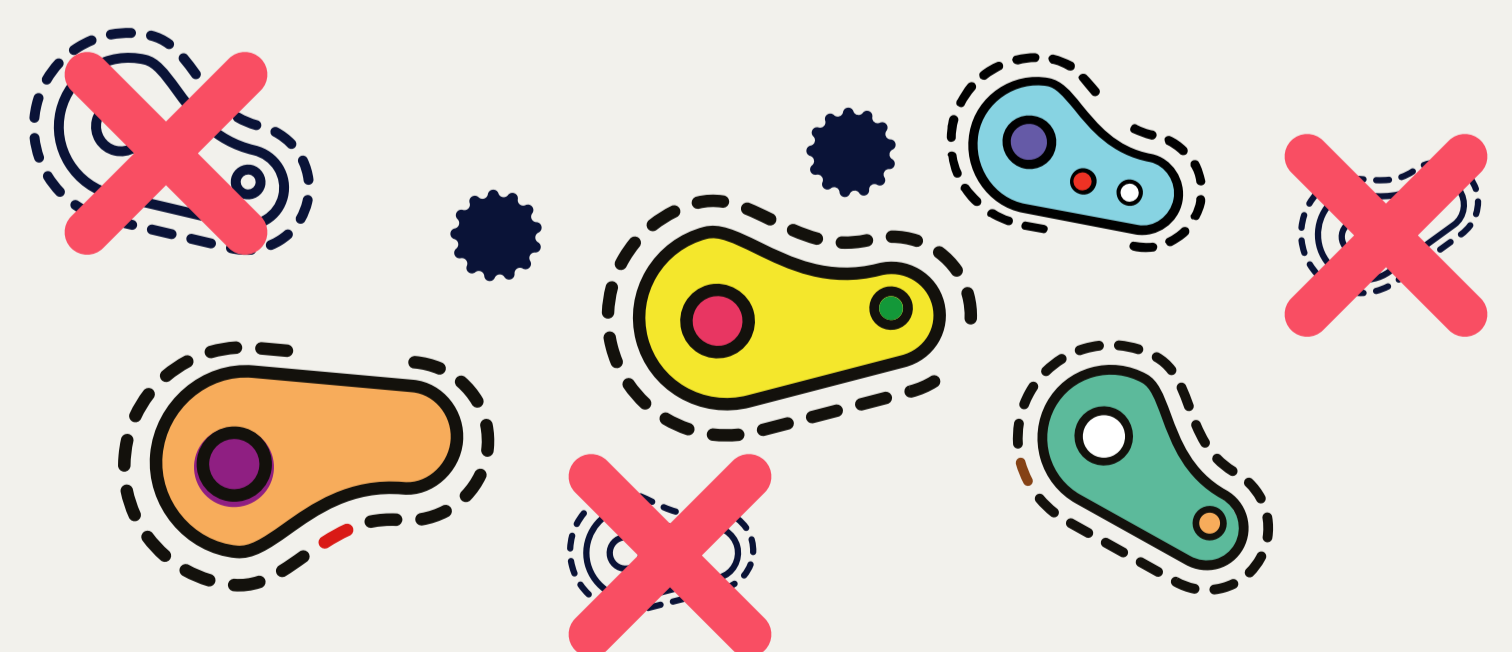
## What is antibiotic resistance?

Antibiotic resistance (ABR) is the ability of some bacteria to protect themselves against the effects of an antibiotic. Clinical resistance means that a bacterium can grow in the antibiotic concentrations reached in the body during therapy resulting in treatment failure.



When an antibiotic is used it disables or kills only the susceptible bacteria but not the ones that have become resistant due to genetic mutations or variation.

Resistant bacteria now grow and multiply. Some bacteria even transfer their "drug-resistance" to other bacteria.



Eventually antibiotic resistance results in treatment failure.

When antibiotics are used again they confront larger numbers of resistant bacteria.

# Spread of Antibiotic Resistance through Food – Animals

Many classes of antimicrobials that are used for humans are also being used in food–animals. Apart from the use of these medicines for treatment of sick animals many food–animal producers also use them to **promote growth** or for routine disease prevention in crowded and unsanitary industrial farming conditions.

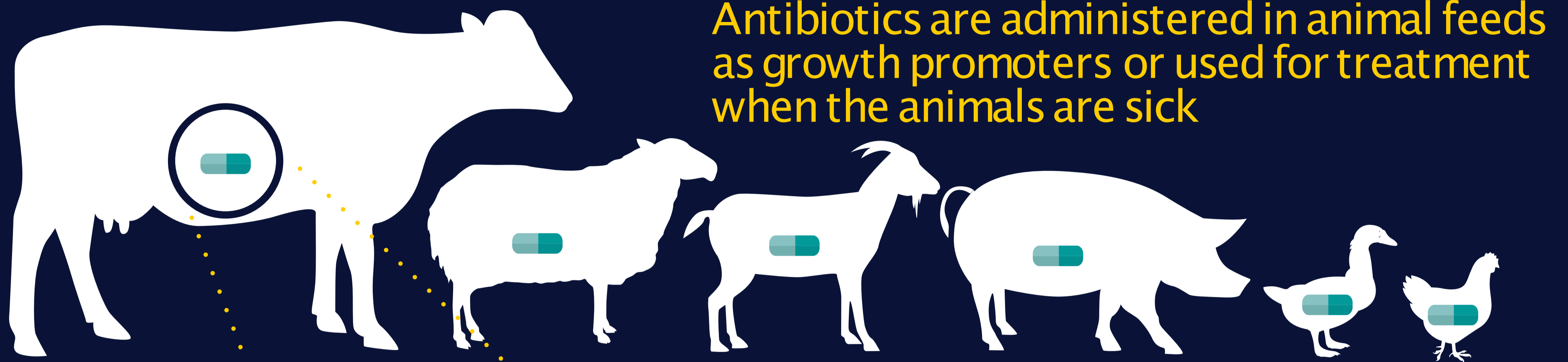
Such indiscriminate use of antibiotics accelerates the development of antibiotic resistant bacteria, which then escape and spread into communities. Farm and slaughterhouse workers, and veterinarians, who come in close contact with colonised or infected animals, are also at risk of carrying such resistant bacteria and passing them on to others.

Bacteria as well as antibiotic residues from food–animal production are also spread widely in the environment, mainly through manure, where it affects bacteria in the environment as well as in wild fauna.

When people are exposed to these resistant bacteria from animals, this leads to resistant infections in humans. Multiple studies show an association between the use of antibiotics in animals and the spread of antibiotic resistance–associated bacteria in humans.



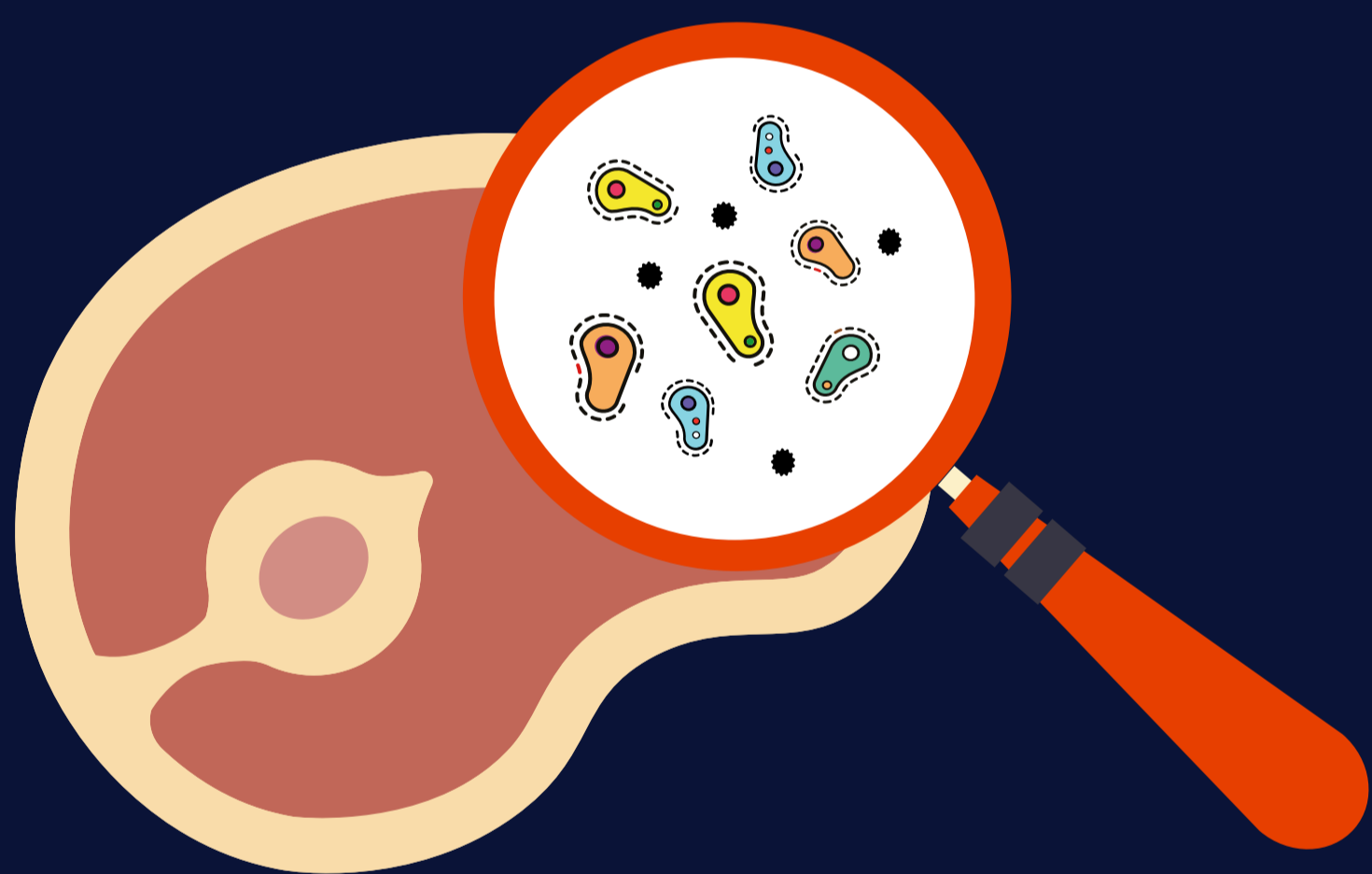
# Antibiotic resistance: from animals to humans



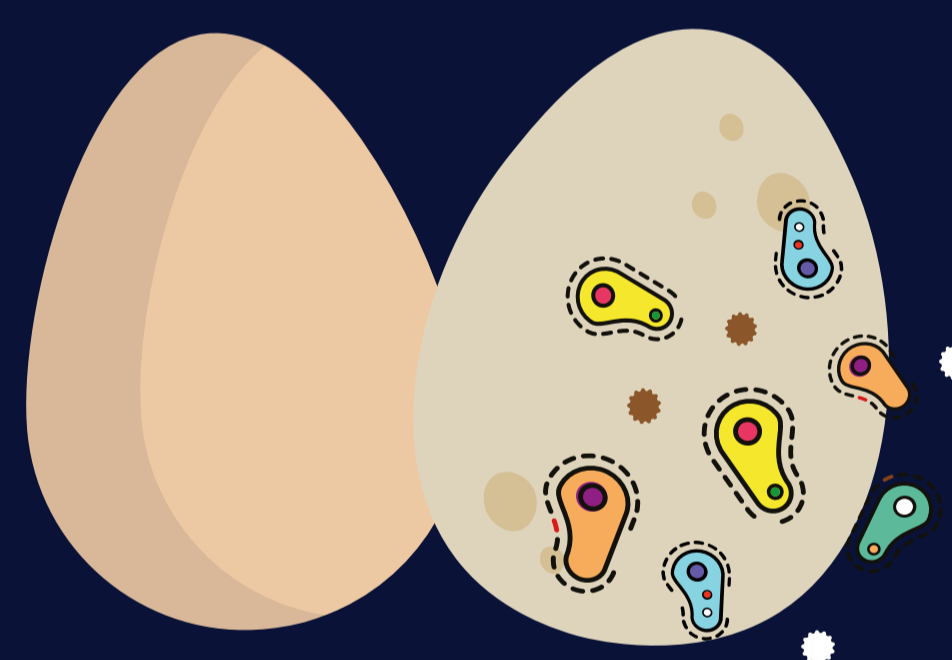
Antibiotics are administered in animal feeds as growth promoters or used for treatment when the animals are sick



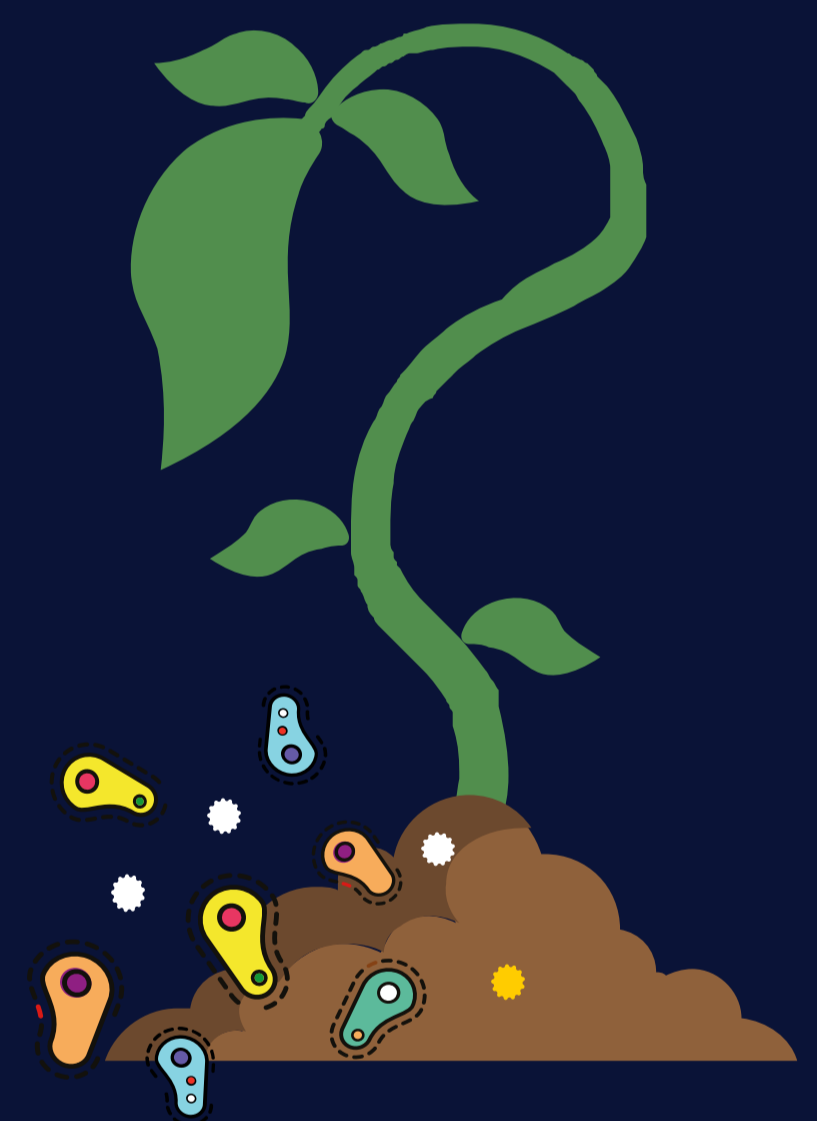
Antibiotics kill susceptible bacteria but resistant bacteria are left to grow and multiply



Resistant bacteria spread through animal meat



Resistant bacteria contaminate food via animal faeces



Resistant bacteria contaminate environment e.g. soil and plants



Resistant bacteria can spread to humans from raw or inadequately cooked food when the raw materials are contaminated or cross-contaminated with other food or through the environment during preparation

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# Pattern of antibiotic resistance in Malaysia

Antibiotic residues in food of animal origin and antibiotic resistance are two major problems that occur when antibiotics are not utilised rationally and prudently in the production of food-animals. In 2012, Malaysia's Department of Veterinary Sciences conducted a preliminary study of antibiotic resistance in food-animals and foods.

## Antibiotic resistant salmonella in food-animals

According to one study conducted under the Livestock Farm Practices Scheme (SALT) programme, 38 isolates of different Salmonella species were taken from chicken cloacal swabs from SALT supervised and certified poultry farms located in central Malaysia for antimicrobial susceptibility testing. The study found that 13.5% of Salmonella were resistant to tetracycline, 5.4% to polymyxin and erythromycin, and 2.7% to chloramphenicol, penicillin G and trimethoprim.

## Antibiotic resistant salmonella in foods

Another study found that 62.8% of Salmonella were isolated from imported products (44.2% beef and 18.6% chicken) out of 43 isolates of different species of Salmonella from food samples including beef, mutton and chicken.

This preliminary study has revealed that SALT certification scheme was less helpful as more than half of bacteria isolated from the domestic chicken were found to be resistant to ampicillin (54.5%), sulphonamide (63.6%) and tetracycline (54.5%). Even worse 87.5% of bacteria isolated from the imported chicken were resistant to ampicillin, 75% to nalidixic acid, and 50% to streptomycin and sulphonamide.

Food/Drug	Domestic Chicken	Imported Chicken	Imported Beef
Ampicillin	54.5%	87.5%	10.5%
Chloramphenicol	45.5%	25.0%	0%
Ciprofloxacin	9.0%	25.0%	5.3%
Gentamicin	40.0%	25.0%	5.9%
Nalidixic Acid	36.4%	75.0%	10.5%
Streptomycin	27.3%	50.0%	0%
Sulphonamide	63.6%	50.0%	5.3%
Tetracycline	54.5%	25.0%	15.8%
Trimethoprim	45.5%	37.5%	10.5%
Trimetoprim +Sulfamethoxazole	36.4%	25.0%	0%

### Reference:

1. Akma Ngah Hamid. Country Report: Malaysia. Department of Veterinary Services. Available at [http://cdn.aphca.org/dmdocuments/Events/36th\\_APHCA\\_Session/Papers/Country%20Report\\_Malaysia%20F.pdf](http://cdn.aphca.org/dmdocuments/Events/36th_APHCA_Session/Papers/Country%20Report_Malaysia%20F.pdf) (accessed on 10 January 2018)
2. Health Action International Asia Pacific (HAIAP), Third World Network Penang, Consumers' Association of Penang. Antibiotic Use and Antibiotics Resistance in Food Animals in Malaysia: A Threat to Human And Animal Health. 10 October 2013.

# Common superbugs in Malaysia

## Listeria monocytogenes

- Multidrug resistant
- Found in frozen burger patties from supermarket or other raw food
- Resistant to tetracycline and erythromycin

## Campylobacter spp.

- Multidrug resistant
- Found in live chickens sold in wet market in Selangor
- Showed resistance to antibiotics such as gentamycin, erythromycin, tetracycline etc.
- Found species include campylobacter jejuni and campylobacter coli



## Carbapenem-resistant enterobacteriaceae

- Resistant to antibiotic called carbapenem
- In 2013, 26 cases were reported in Sibu Hospital, Malaysia. 10 fatalities were reported and two of the infected patients died due to direct infection

## Other superbugs

- Methicillin-resistant Staphylococcus aureus (MRSA)
- Streptococcus pneumoniae
- Acinetobacter sp.
- Escherichia coli
- Klebsiella pneumoniae
- Enterobacter cloacae
- Pseudomonas aeruginosa
- Haemophilus influenza
- Salmonella typhi
- Salmonella spp.
- Neisseria meningitides
- Neisseria gonorrhoea

# Certain antibiotics are just too harmful to be on the loose

## 'There is no safe level of residue'

Reference:

1. National Pharmaceutical Regulatory Agency. Registration and Regulatory Control of Veterinary Products in Malaysia. Available

at [http://vam.org.my/home/wp-content/uploads/2017/11/Pn-Asnida\\_VMP-Registration-and-Control.pdf](http://vam.org.my/home/wp-content/uploads/2017/11/Pn-Asnida_VMP-Registration-and-Control.pdf) (access on 12 December 2017)

2. Stop the use of banned antibiotics in prawn farming — Penang Consumers Association. Malaymail Online. 6 May 2016. Available

at <http://www.themalaymailonline.com/print/what-you-think/stop-the-use-of-banned-antibiotics-in-prawn-farming-consumers-association-o> (accessed on 12 December)

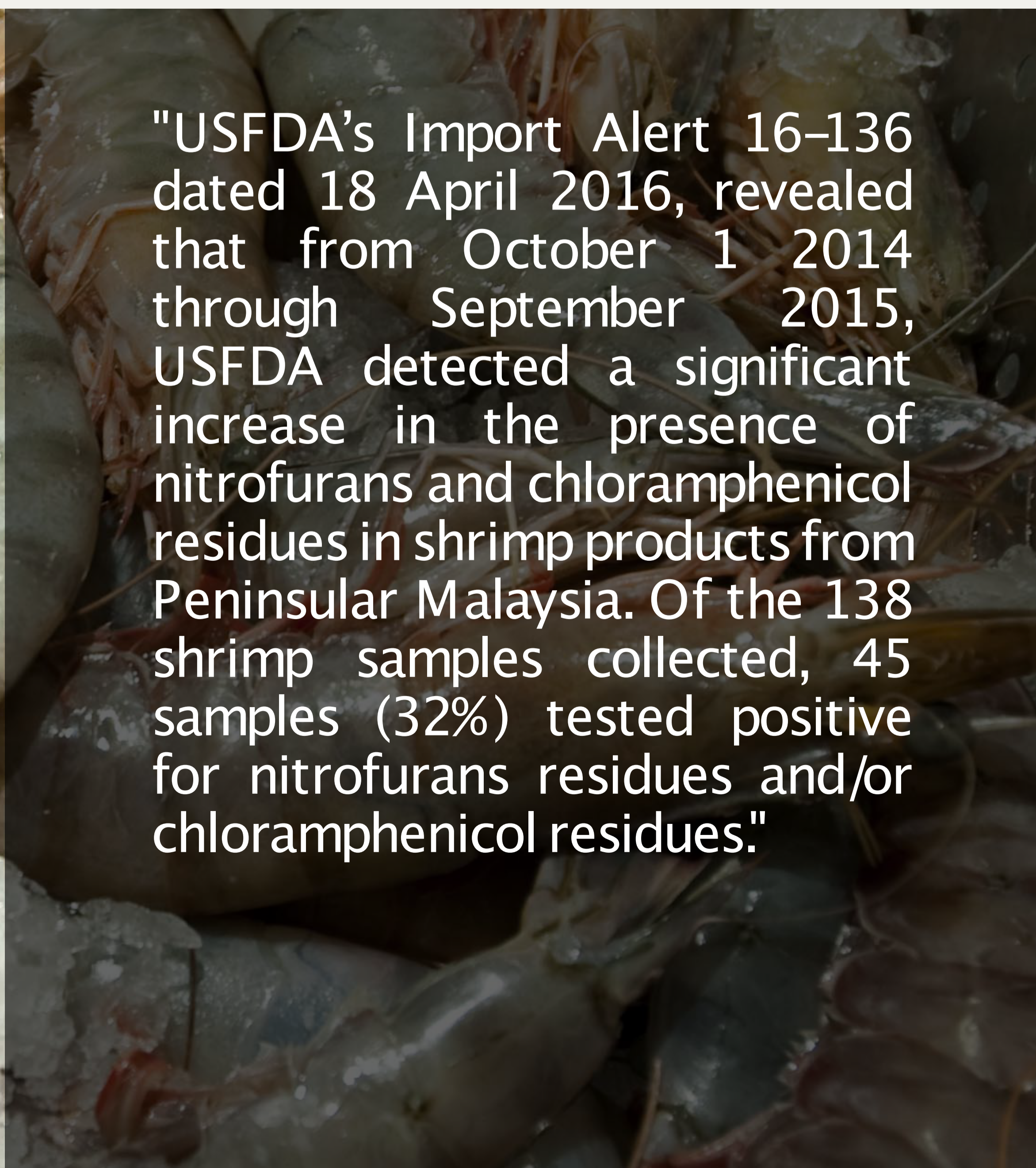
There are some antibiotics which are totally prohibited for use in food-animals because of the concern about severe toxicity and emergence of antibiotic resistant strains of bacteria.

Antibiotics that are **NOT allowed** for use in food-animals and aquaculture products in Malaysia are:

- Avoparcin
- Chloramphenicol
- Nitrofurans i.e. nitrofuratoin, nitrofurazone, furazolidone and furaltadone
- Teicoplanin
- Vancomycin
- Norfloxacin

Avoparcin, teicoplanin and vancomycin are banned to curb the emergence of vancomycin resistant enterococci (VRE) as avoparcin and teicoplanin share a spectrum of antimicrobial activities similar to vancomycin.

Chloramphenicol and nitrofurans are prohibited for application on all food-animals due to the concern that these drugs could cause harmful effects to human health. Nitrofurans have shown a variety of toxic effects on humans, including mutagenic, genotoxic and carcinogenic properties; Chloramphenicol may lead to severe bone marrow suppression, aplastic anaemia.



"USFDA's Import Alert 16-136 dated 18 April 2016, revealed that from October 1 2014 through September 2015, USFDA detected a significant increase in the presence of nitrofurans and chloramphenicol residues in shrimp products from Peninsular Malaysia. Of the 138 shrimp samples collected, 45 samples (32%) tested positive for nitrofurans residues and/or chloramphenicol residues."

# Consequences of antibiotic resistance

Antibiotic resistance poses a great threat to food safety and public health when the resistant bacteria spread from food–animals to humans through the food chain. Antibiotics used in the first line treatment are no longer effective to eradicate common food borne disease causing bacteria such as Salmonella and Campylobacter.



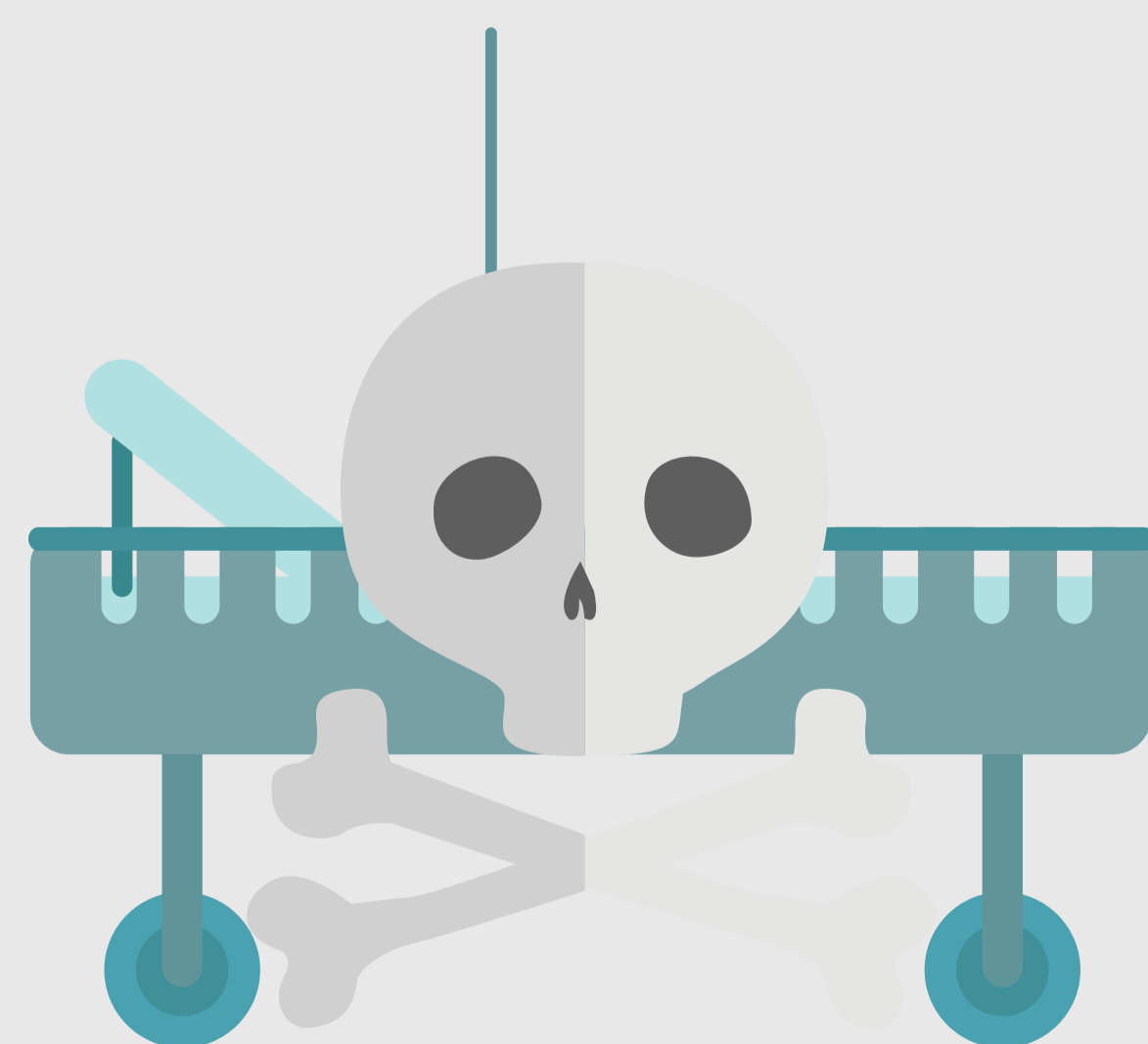
Infections which used to be common become more difficult to treat



The length of hospital stay increases to, on average, more than 25 days



Treatment cost is higher



Risk of bloodstream infections and death is higher

# Who are at risk?

In general, certain groups of people whose immune systems are weak and who have an increased risk for getting infections are at a higher risk of being infected by antibiotic resistant bacteria.



Infants, especially premature babies



Seniors, particularly those living in long term care facilities



People with weakened immune systems due to illnesses or injury



Farmers who may have direct contact with sick animals



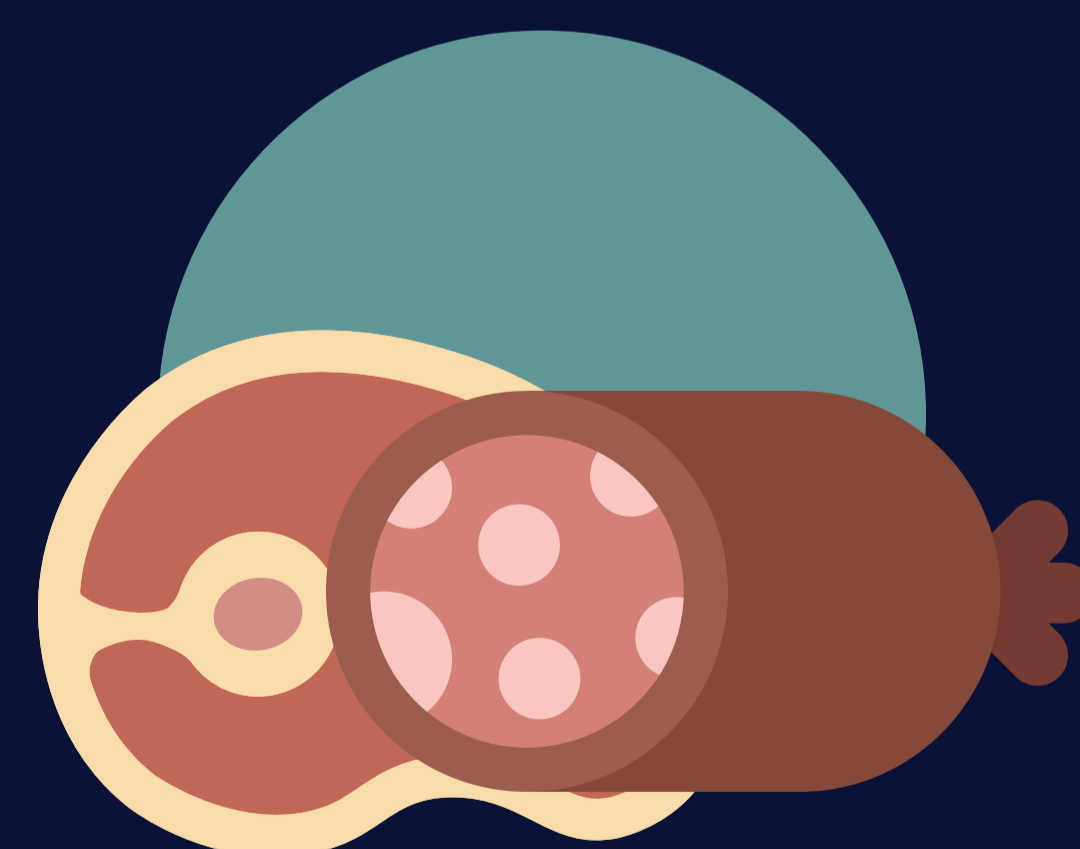
People who are living in a crowded and unhygienic place



People who do not practice good hygiene habits like hand hygiene



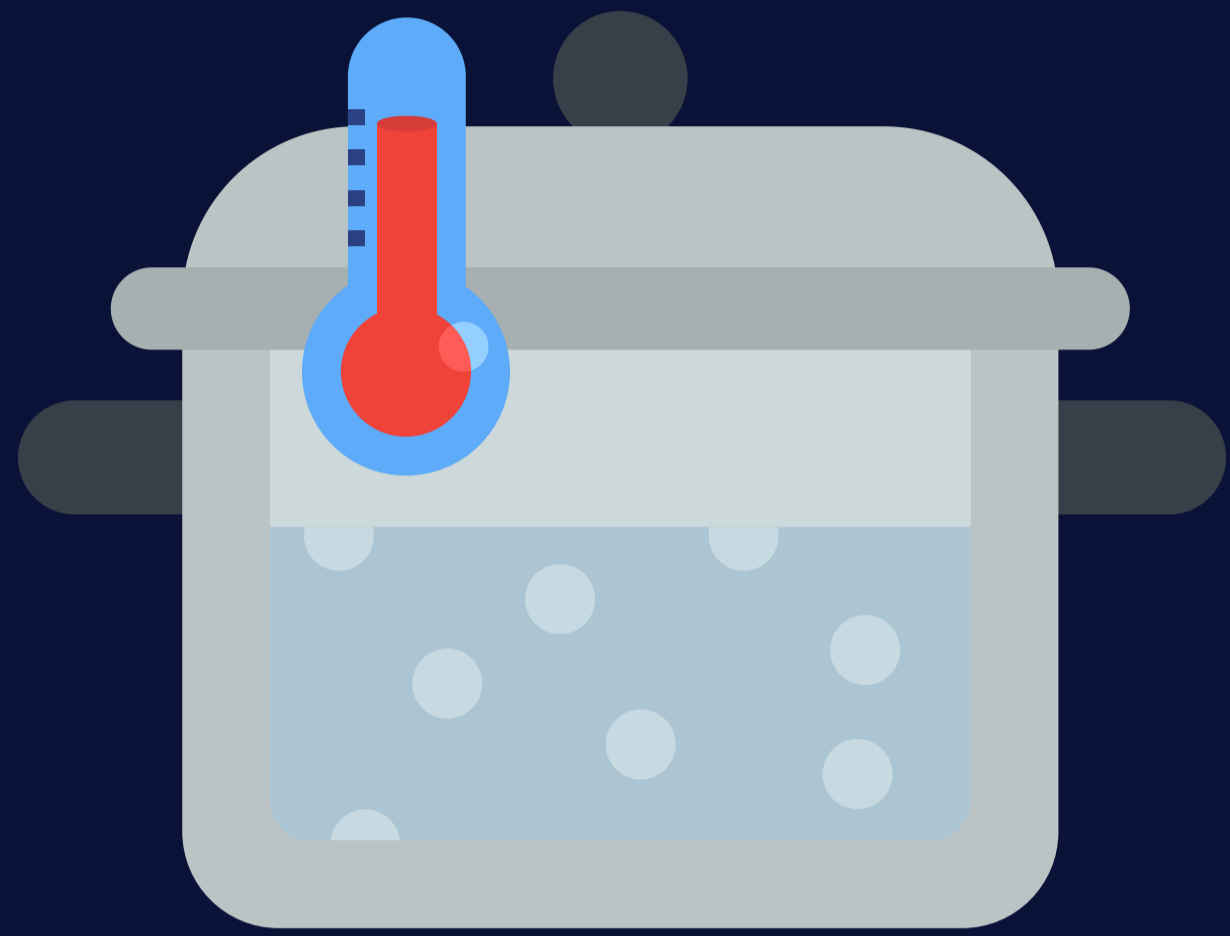
Personnel who work in healthcare facilities and day care centres such as doctors, nurses etc.



Slaughter house and meat processing plant workers or butchers

# Reduce the chances of infection

Follow simple food safety tips: **COOK, CLEAN, CHILL, SEPARATE**



## COOK

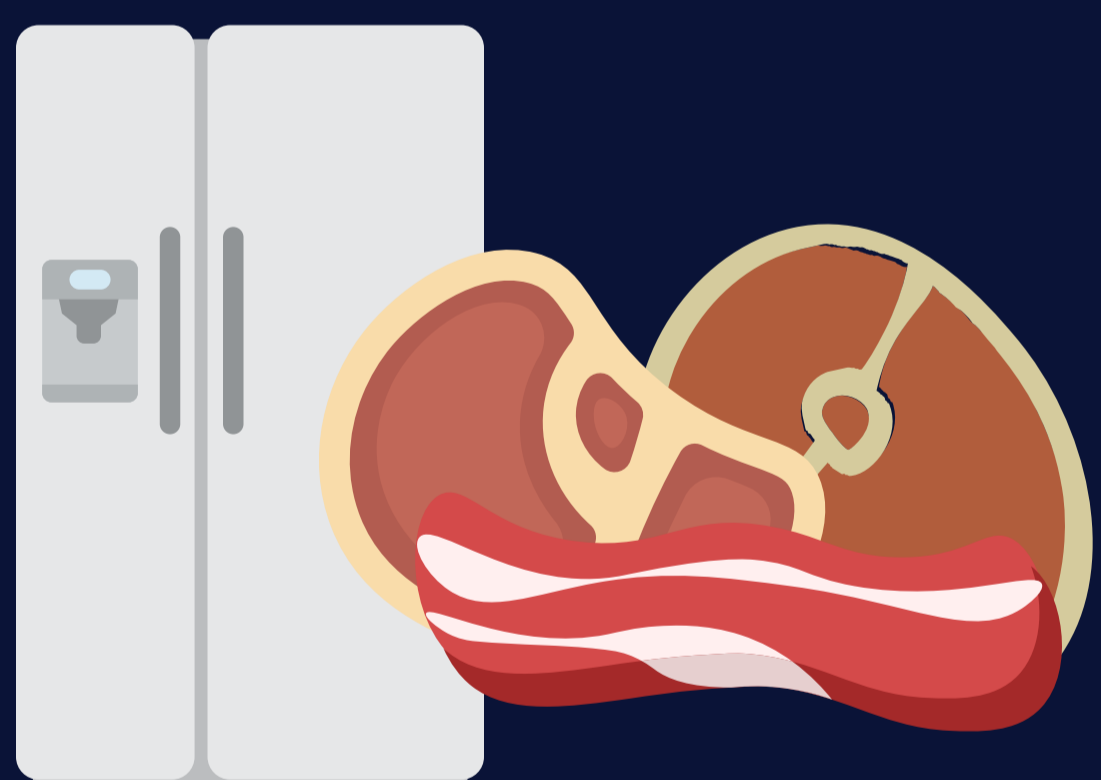
Food should be cooked to a safe internal temperature.

- 68°C for whole beef, pork, lamb, and veal (allowing the meat to rest for 3 minutes before carving or consuming) or 72°C for ground meats
- 74°C for for all poultry, including ground chicken and ground



## CLEAN

- Wash hands before handling raw foods to avoid contamination especially after contact with animals or animal environment.
- Wash hands after touching raw meat, poultry or seafood.
- Wash the work surfaces, cutting boards, utensils and grill before and after cooking.



## CHILL

Keep the temperature of the refrigerator below 4°C and refrigerate foods within 2 hours of cooking.



## SEPARATE

Bacteria from raw meat, poultry, seafood, and eggs can spread to produce and ready-to-eat foods

- Do not store raw and cooked food in the same space.
- Handle raw meats and ready-to-eat foods separately. Use different cutting boards to prepare raw meats and any food that will be eaten without cooking.

Reference:

1. Centers for Disease Control and Prevention. Antibiotic Resistance, Food and Food-producing Animals. Available at <https://www.cdc.gov/features/antibiotic-resistance-food/index.html> (accessed on 10 January 2018)

# Overview of policies

## Registration of veterinary products

According to Registration Guideline of Veterinary Products (REGOVP), all new veterinary products must be registered with NPRA and fulfil all requirements in the aspects of quality, safety and residues and efficacy, in compliance with all related legislation including Dangerous Drugs Act 1952, Poisons Act 1952, Medicine (Advertisement & Sales) Act 1956 and any other relevant acts. In taking the measure to prevent counterfeit products, all registered products are affixed with a security device, which is serialised and could be used to authenticate and verify if the product is registered. All veterinary products must go through a series of testings and conform to other guidelines governing various components including manufacturing, labelling and packaging, quality control, residual limit and list of ingredients which are not allowed in veterinary products before the veterinary products are made available in the market.

## Monitoring programme of antibiotic residues

Monitoring of veterinary drug residues including antibiotics in animal feed has been implemented by DVS since year 2013 with reference to EEC Directive 1990. Sampling plan, number and type of sample, type of testing, feed millers, importers and distributors will be identified and monitored based on the Animal Feed Act 2009. Two groups of veterinary drugs will be monitored – Group A and Group B drugs. Group A consists of banned drugs including chloramphenicol and nitrofurans while Group B refers to the drugs for which there are MRLs such as tetracycline, quinolone, sulphonamide and others. The monitoring is carried on yearly basis and the species of animal involved are poultry, bovine, porcine and goat/sheep. The sampling plan is based on the number of livestock slaughtered from the previous year.

### Reference:

1. National Pharmaceutical Regulatory Agency. Registration Guidelines of Veterinary Products. Third version. 2014.

2. Akma Ngah Hamid. Country Report: Malaysia. Department of Veterinary Services. Available at [http://cdn.aphca.org/dmdocuments/Events/36th\\_APHCA\\_Session/Papers/Country%20Report\\_Malaysia%20F.pdf](http://cdn.aphca.org/dmdocuments/Events/36th_APHCA_Session/Papers/Country%20Report_Malaysia%20F.pdf) (accessed on 10 January 2018)



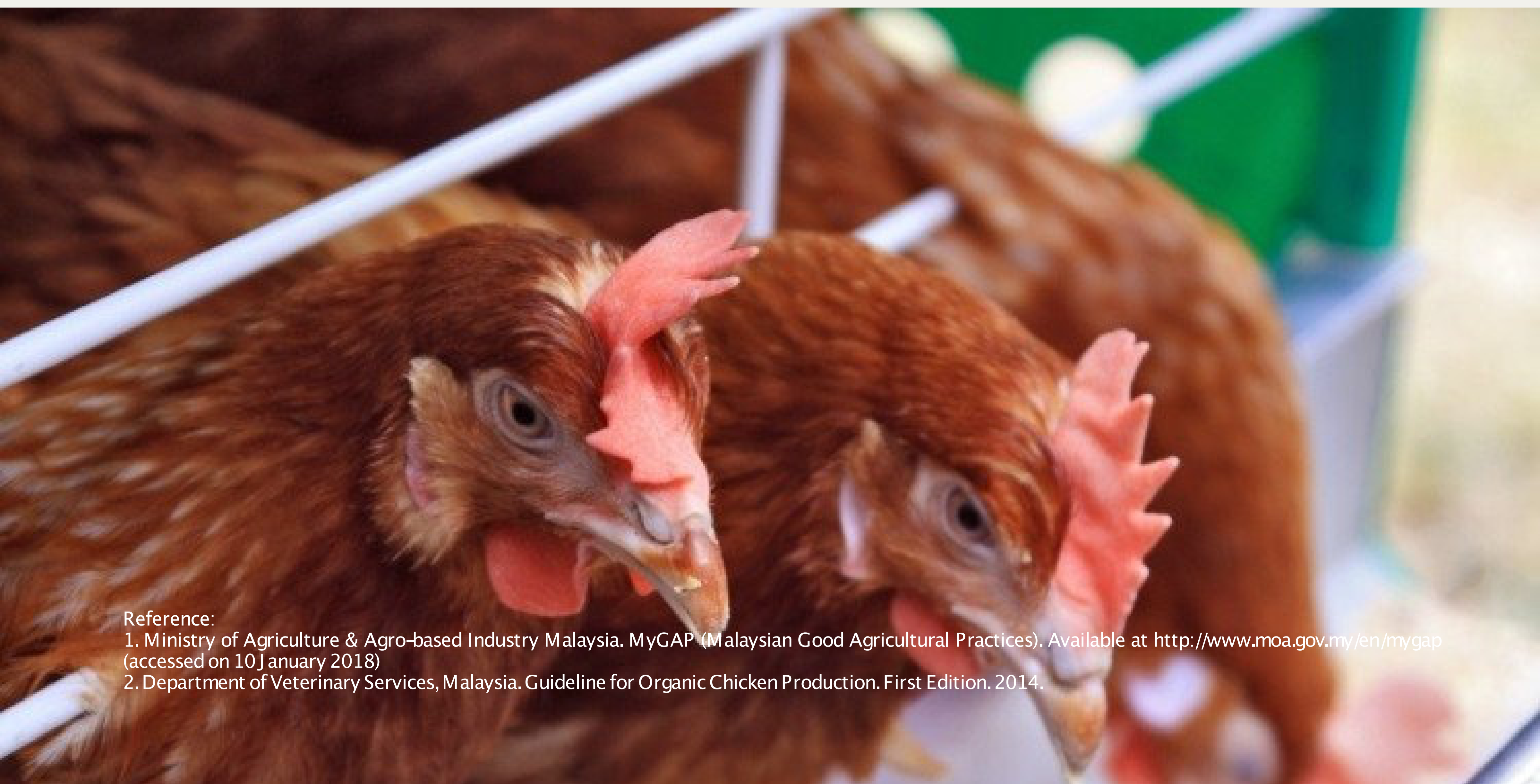
# Overview of policies

## Malaysian Good Agricultural Practices (MyGAP)

MyGAP was launched on 28 August 2013 as an Economic Transformation Programme (ETP) initiative under the Strategic Reform Initiatives–Competition, Standard and Liberalisation (SRI-CSL) which is an enabler to the National Key Economic Area – Agriculture (NKEA – Agriculture). MyGAP is a certification scheme for not only agricultural sector, but also livestock and aquaculture sector and is implemented based on Malaysian Standard (MS), including MS 1998:2007 Good Aquaculture (GqaP) and MS 2027:2006 Good Animal Husbandry Practice. MyGAP is a rebranding exercise of Malaysian Farm Certification Scheme for Livestock Farm Practices Scheme (SALT) and Malaysian Aquaculture Farm Certification Scheme (SPLAM). This certification is to ensure quality and safe produces and to benchmark Malaysian agricultural produces against international GAP certification scheme such as ASEAN GAP and Global GAP.

## Guideline for Organic Chicken Production

In response to increasing demand for organic produce due to increased public awareness of food safety issues on the use of veterinary drugs in poultry produce, in 2014, Department of Veterinary Services (DVS) Malaysia has published a Guideline for Organic Chicken Production to guide the farmers. Director General of DVS encourages farmers to adopt the guidelines to ensure the product meets the requirement of organic chicken. One of the guidelines is that no antibiotics, coccidiostats and medicinal substances or any other substance intended to stimulate growth or production should be used in animal feed.



Reference:

1. Ministry of Agriculture & Agro-based Industry Malaysia. MyGAP (Malaysian Good Agricultural Practices). Available at <http://www.moa.gov.my/en/mygap> (accessed on 10 January 2018)
2. Department of Veterinary Services, Malaysia. Guideline for Organic Chicken Production. First Edition. 2014.



# What can be done

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It is established that antibiotic resistance is influenced by both human and non-human antibiotic use. Antibiotics are supposed to treat infections and save lives, but due to excessive and unnecessary use rather than genuine medical need, this has backfired on us. Therefore immediate and collective actions from all relevant parties should be taken to prevent this from deteriorating.

The state of antibiotic resistance in Malaysia is unclear and results of existing research in this area have not been widely communicated to the public. Comparatively little published information exists on antibiotic usage in animal husbandry in the country. Besides, application of antibiotics in aquaculture sector is largely undocumented and unregulated. The possibility of unacceptable residues in these products may be more likely to occur.

It is commendable that MOH Malaysia has implemented a few measures to contain the spread of antibiotic resistance. One of these is the inauguration of a new policy under Customs (Prohibition of Imports) Order stating that all licensed drug importers who intend to import polymyxins, including colistin, which is regarded as the antibiotic of last resort after other antibiotic options have failed, must obtain import permit other than ordinary poison licence type A/B. However more aggressive, comprehensive and concerted strategies need to be rolled out.

Even though we have policies and relevant acts in place to help regulate the use of antibiotics in animal feed, however such acts may not be kept up with the times. In January 2006, European Union had already implemented an EU-wide ban on the use of antibiotics as growth promoters in animal feed as part of their food safety strategy and efforts to address antibiotic resistance. There have been a few incidents in recent times, that point to imprudent use of antibiotics and poor monitoring and enforcement of regulations in Malaysia.

The Malaysian government should take immediate action to phase out, and ultimately ban, the use of antibiotics in food-animals for non-therapeutic use.

1. Review on Antimicrobial Resistance. 2016. Tackling Drug-resistant Infections Globally: Final Report and Recommendations.

2. Circular of Pharmaceutical Services Division, Ministry of Health Malaysia. Early notification of requirement of import permit/e-permit under Customs (Prohibition of Imports) Order for importation of polymyxin including colistin. 14 December 2017.

3. Health Action International Asia Pacific (HAIAP), Third World Network Penang, Consumers' Association of Penang. Antibiotic Use and Antibiotics Resistance in Food Animals in Malaysia: A Threat to Human And Animal Health. 10 October 2013.

# Recommendations

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The following recommendations are aimed to reduce unnecessary use and promote judicious use of antibiotics

- Conduct research to better understand the economic, medical and social factors that are propelling the use of antibiotics in food-animal production.
- Create national systems to monitor drug usage in food-animals and fisheries; drug residues; antibiotics use and resistance; and diseases in livestock and aquaculture.
- Change incentives to discourage unnecessary antibiotic use in animals and provide incentives to promote organic farming
- Provide education and training for livestock farmers on antibiotic resistance and responsible use of antibiotics
- Phase out the non-therapeutic use of antibiotics in food-animals
- Ban the use of critically important antibiotics in food-animal production



# Recommendations



- Monitor and enforce the withdrawal period rigorously between the use of antibiotics and animal slaughter.
- Promote alternative growth promoters where possible
- Establish a formal mechanism of interaction between the MOH, the DVS and the Department of Fisheries
- Create a national task force comprising healthcare professionals, veterinarians, academicians, agricultural scientists, consumers and the media to raise awareness about antibiotic resistance
- Prioritise research, collect data and recommend policies to contain antibiotic resistance in the country
- Strengthen hygiene in the food chain
- Improve hygiene in animal husbandry, food production and processing to reduce contamination.
- Monitor imported meat products for antibiotic resistant contamination

Ever since they were discovered over eight decades ago, antibiotics have saved countless lives from infectious diseases and transformed modern medical procedures, including surgery, organ transplantation and cancer treatment. However, over the years, the slow but steady spread of antibiotic resistance — whereby the bacteria turn antibiotics ineffective — threatens to undo these important gains and take the world back to a pre-antibiotic era.

While a significant role in the spread of such resistance has been played by the growing use of antibiotics in the human health sector, in recent years there has been recognition of the problems arising from even greater use of these miracle drugs in food-animal production.

This booklet gives an overview of antibiotic use in food-animal production in Malaysia, the spread of antibiotic resistance, response of concerned authorities and recommendations for improving the situation. It is aimed at a broad audience including policy makers, health professionals, media and interested members of the public.



**TOOLBOX**

*The ReAct Toolbox is a web-based knowledge repository for antibiotic resistance that collects:*

- Scientifically accurate information
- Practical advice
- Links to useful resources
- Examples from the field

Access  
the Toolbox:



[www.reactgroup.org/toolbox](http://www.reactgroup.org/toolbox)