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Get Future Ready…

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Preparing For The Future: Responsible use of Antibiotics for Sustainable Growth

Dr. Marcos Rostango,
Technical & Innovation Director, Trouw Nutrition Global

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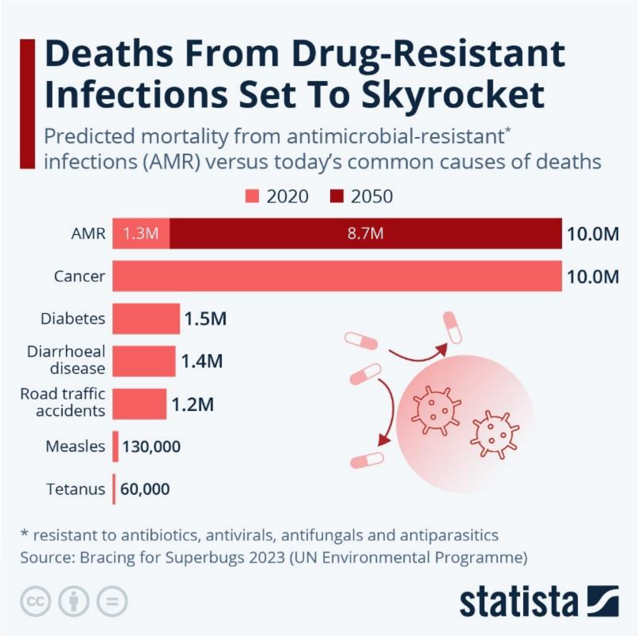

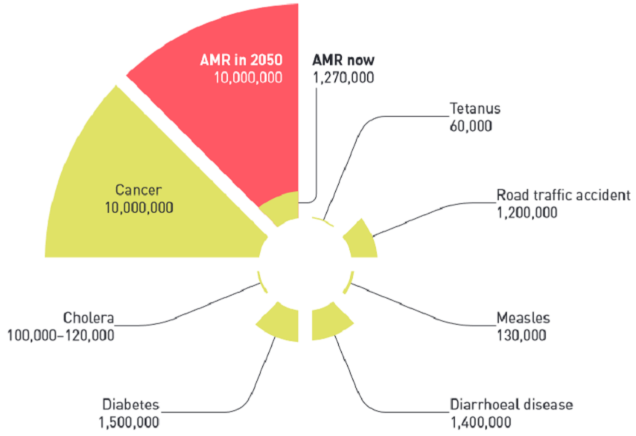

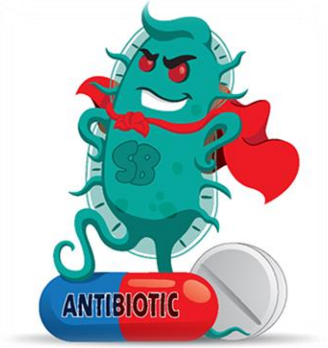

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who.int/news/item/07-11-2017-stop-using-antibiotics-in-healthy-animals-to-prevent-the-spread-of-antibiotic-resistance

Home / News / Stop using antibiotics in healthy animals to prevent the spread of antibiotic resistance

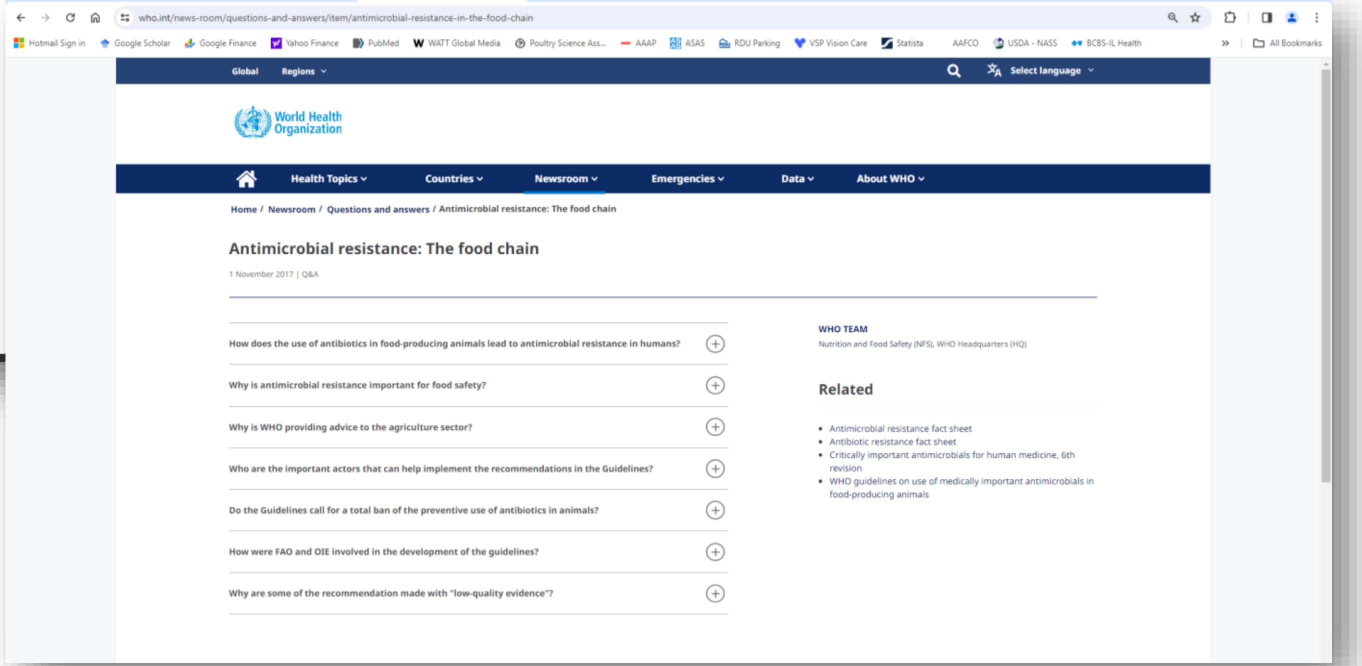
Stop using antibiotics in healthy animals to prevent the spread of antibiotic resistance

7 November 2017 | News release | Geneva | Reading time: 3 min (721 words)

WHO is recommending that farmers and the food industry stop using antibiotics routinely to promote growth and prevent disease in healthy animals.

Media Contacts

Christian Lindmeier



who.int/news-room/questions-and-answers/item/antimicrobial-resistance-in-the-food-chain

Home / Newsroom / Questions and answers / Antimicrobial resistance: The food chain

Antimicrobial resistance: The food chain

1 November 2017 | Q&A

- How does the use of antibiotics in food-producing animals lead to antimicrobial resistance in humans?
- Why is antimicrobial resistance important for food safety?
- Why is WHO providing advice to the agriculture sector?
- Who are the important actors that can help implement the recommendations in the Guidelines?
- Do the Guidelines call for a total ban of the preventive use of antibiotics in animals?
- How were FAO and OIE involved in the development of the guidelines?
- Why are some of the recommendation made with "low-quality evidence"?

WHO TEAM

Nutrition and Food Safety (NFS), WHO Headquarters (HQ)

Related

- Antimicrobial resistance fact sheet
- Antibiotic resistance fact sheet
- Critically important antimicrobials for human medicine, 6th revision
- WHO guidelines on use of medically important antimicrobials in food-producing animals

MARCH 1, 2023 | 3 MIN READ

To Fight Antimicrobial Resistance, Start with Farm Animals

Governments must regulate drug misuse in food animals that is contributing to antimicrobial resistance

BY THE EDITORS

Credit: Martin Gee

March 2023 Issue · Animals

MARCH 2023 SCIENTIFICAMERICAN.COM
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Forbes

FORBES > BUSINESS

BREAKING

Antibiotics Use In Farm Animals Is Growing—Here's Why It Could Pose A Danger To Humans

Robert Hart Forbes Staff

I cover breaking news.

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Feb 1, 2023, 02:00pm EST

https://www.forbes.com/sites/roberthart/2023/02/01/antibiotics-use-in-farm-animals-is-growing-heres-why-it-could-pose-a-danger-to-humans/?sh=5d1314b9200a

https://www.scientificamerican.com/article/to-fight-antimicrobial-resistance-start-with-farm-animals/

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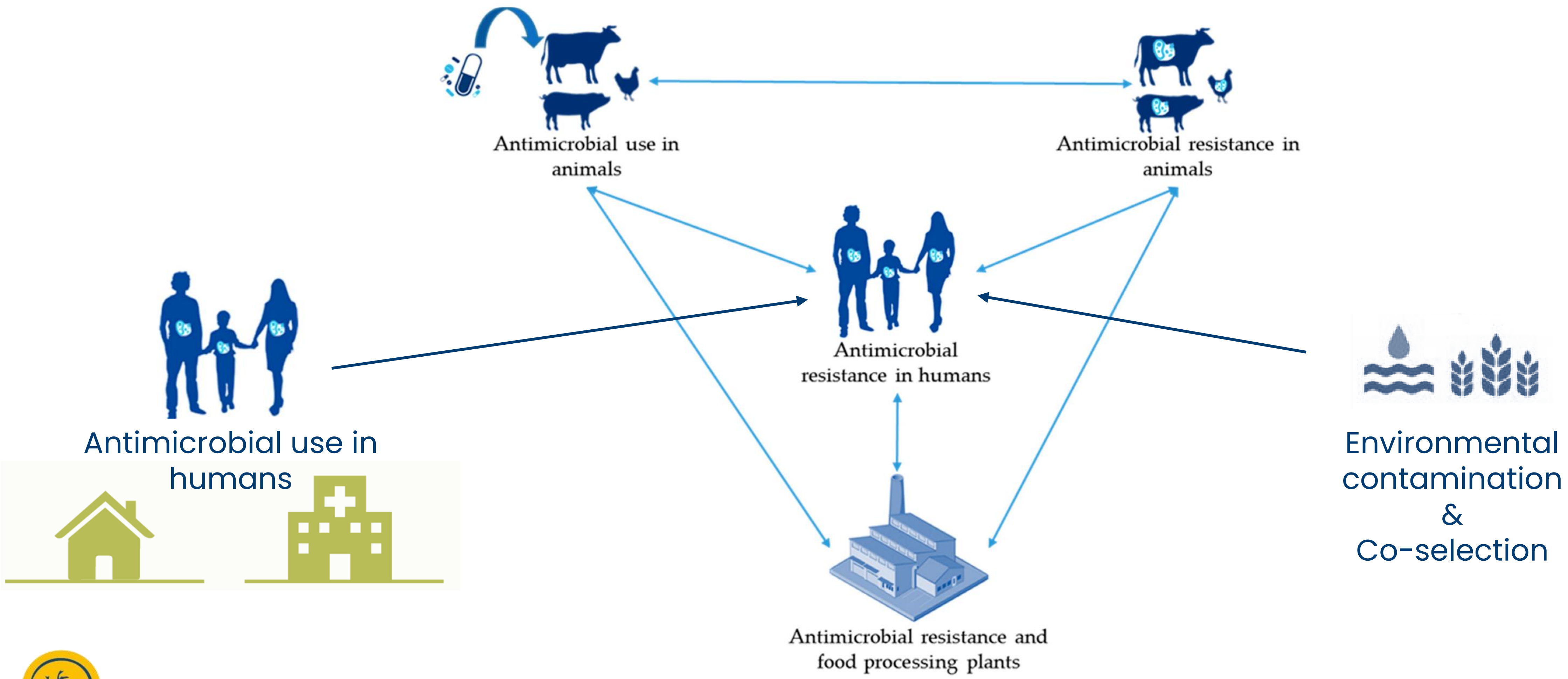
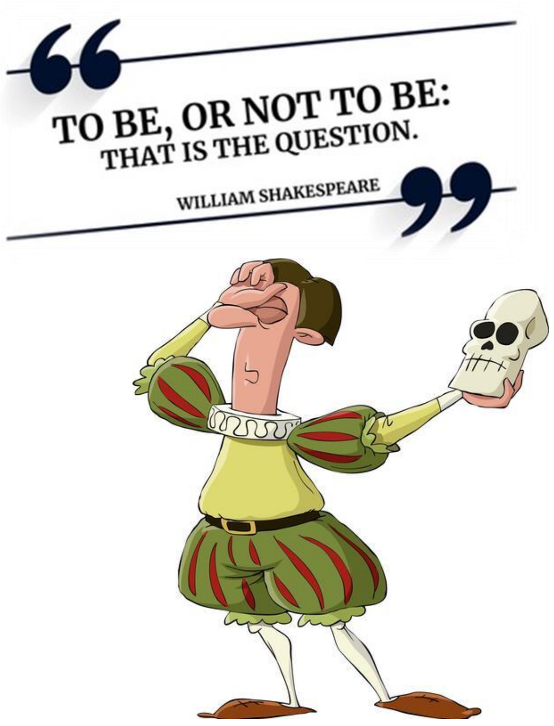

Antimicrobial use in animals
Antimicrobial resistance in animals
Antimicrobial resistance in humans
Antimicrobial use in humans
Environmental contamination
&
Co-selection
Antimicrobial resistance and food processing plants

Antibiotics in animal production: To Use, or Not To Use...



Antibiotics in animal production: To Use, or Not To Use...

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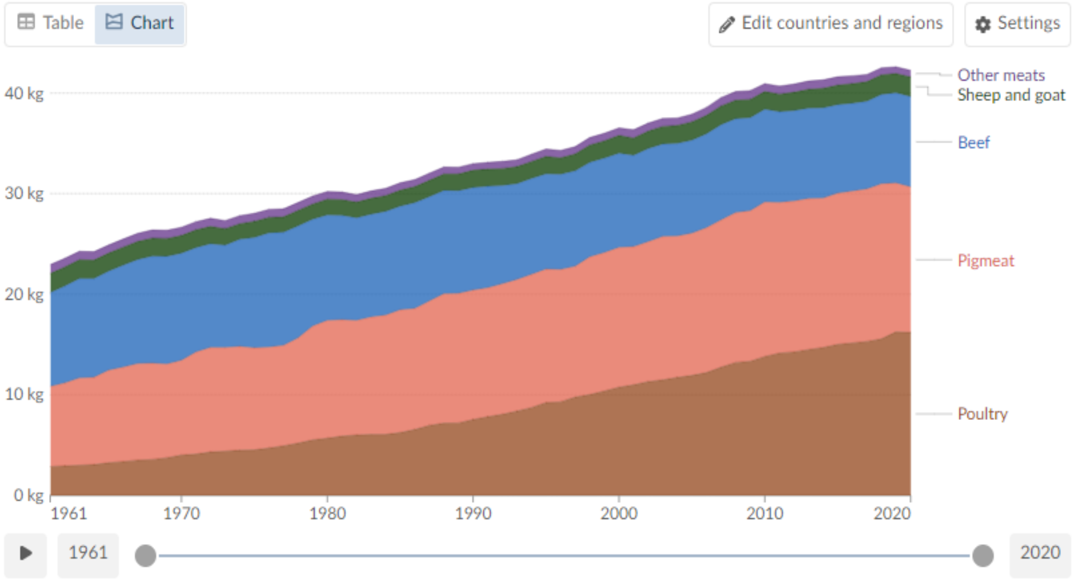
Food Safety

Sustainability

Animal Welfare

Per capita meat consumption by type, World, 1961 to 2020

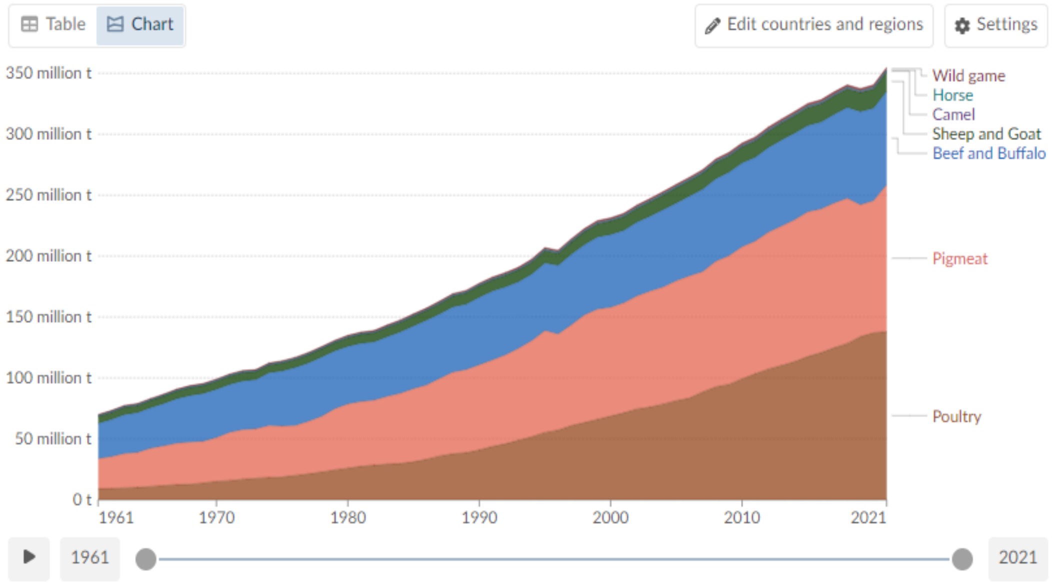
Per capita meat consumption is broken down by types of meat, and is measured in kilograms per person per year.



Data source: Food and Agriculture Organization of the United Nations – Learn more about this data

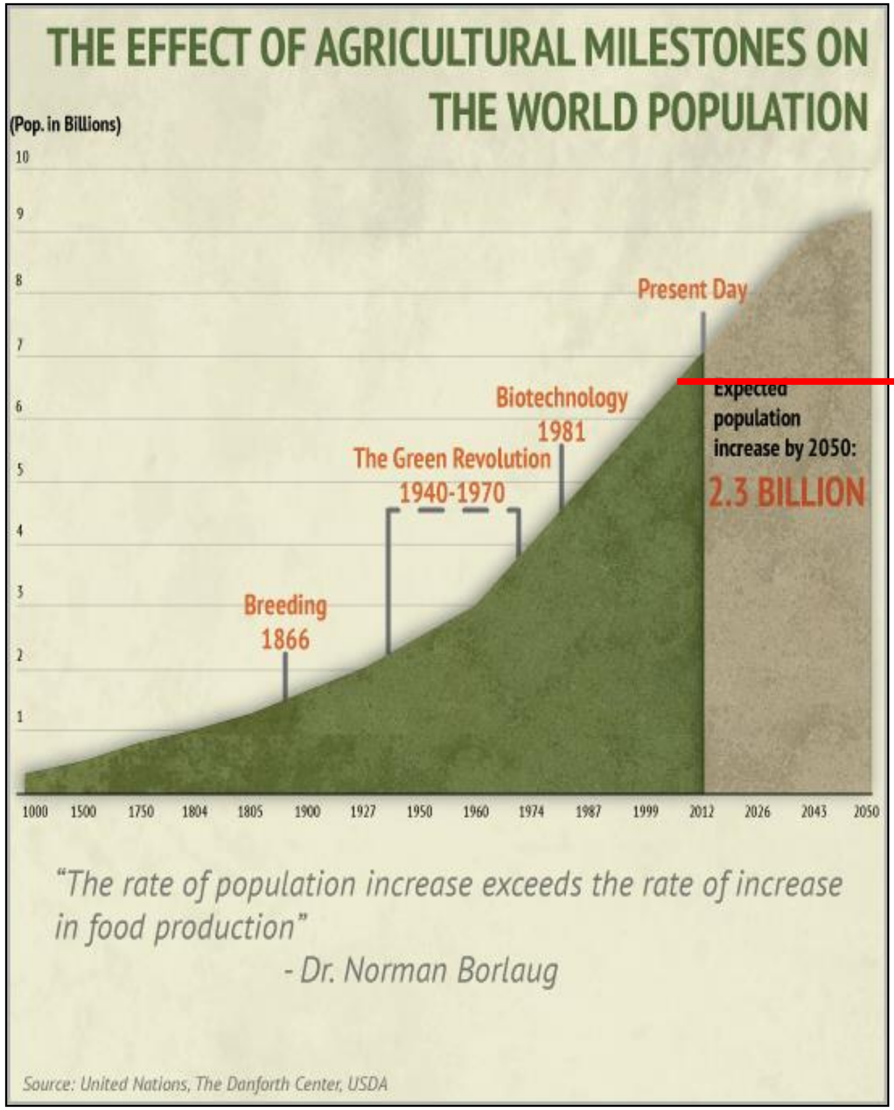
Note: Data does not include fish and seafood. Figures do not correct for waste at the consumption level so may not directly reflect the quantity of food finally consumed by a given individual.

Meat production by livestock type, World, 1961 to 2021



Data source: Food and Agriculture Organization of the United Nations – Learn more about this data

Note: Total meat production includes both commercial and farm slaughter. Data are given in terms of dressed carcass weight, excluding offal and slaughter fats.



How do we keep up with it?

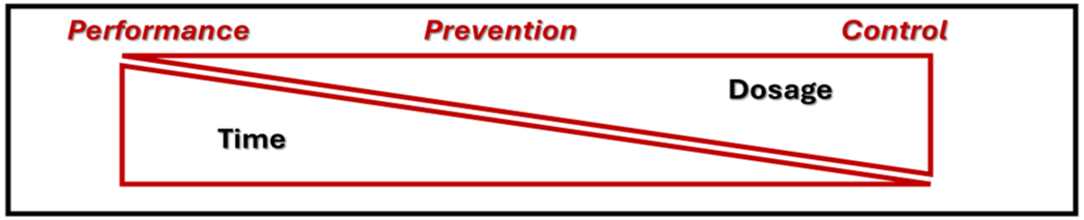
How can we make sure there is enough food?

Antibiotics in Animal Production

- ✓ **Performance enhancement = Growth promotion (GPA's or AGP's)**
- ✓ **Disease prevention = Preventive or strategic use**
- ✓ **Disease control and treatment = Therapeutic use**

Table 1. American Veterinary Medical Association Definitions of Antimicrobial Use

Antibiotic Purpose	AVMA Definition for Individual Animals	AVMA Definition for Groups of Animals
Disease treatment	Administration of an antimicrobial as a remedy for an individual animal with evidence of infectious disease	Administration of an antimicrobial to those animals within the group with evidence of infectious disease
Disease control	Administration of an antimicrobial to an individual animal with a subclinical infection to reduce the risk of the infection becoming clinically apparent, spreading to other tissues or organs, or being transmitted to other individuals	Administration of an antimicrobial to reduce the incidence of infectious disease in a group of animals that already has some individuals with evidence of infection
Disease prevention	Administration of an antimicrobial to an individual animal to mitigate the risk for acquiring a disease or infection that is anticipated based on history, clinical judgment, or epidemiological knowledge.	Administration of an antimicrobial to a group of animals, none of which have evidence of disease or infection, when transmission of existing undiagnosed infections, or the introduction of pathogens, is anticipated based on history, clinical judgment, or epidemiological knowledge.



What does it all mean?

AGP's or GPA's

⬇

Antibiotics Growth Promoters
Growth Promoter Antibiotics

≠

ABF or NAE

⬇

Antibiotic-Free
No Antibiotics Ever

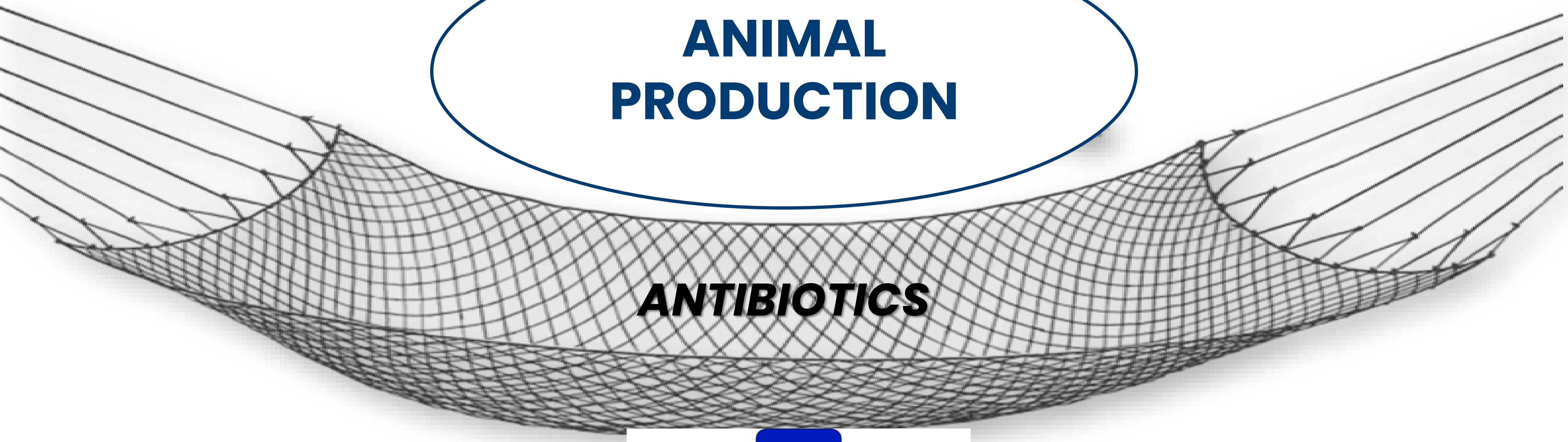
What does it all mean?

- ✓ **Reduction of competition for nutrients in the intestinal tract**
- ✓ **Reduction of growth-depressing metabolites generated by the microbiota**
- ✓ **Improvement of absorption and nutrient utilization by the intestinal tract**
- ✓ **Control of endemic subclinical infections**
  - ↳ **Reduction of the metabolic cost of immune response**
- ✓ **Non-antibiotic anti-inflammatory effect on the intestinal tract**

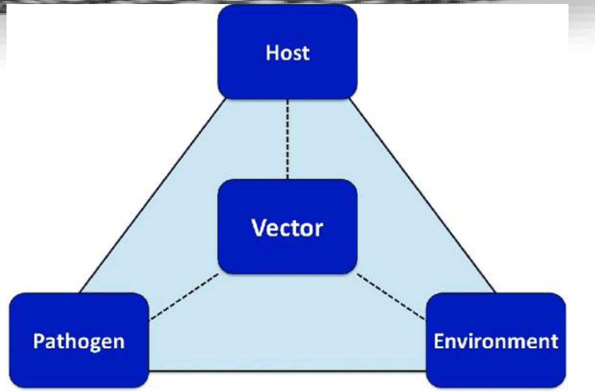
Gut Health

Animal Production

ANIMAL PRODUCTION



Problems/Challenges ➡



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- ‘There was no significant effect of AGPs on the cumulative growth or feed efficiency parameters at the end of the production cycles and cumulative mortality rates were also similar across groups.’

  Source: Effects of Dietary Antimicrobial Growth Promoters on Performance Parameters and Abundance and Diversity of Broiler Chicken Gut Microbiome and Selection of Antibiotic Resistance Genes, Paul et al, Frontiers in Microbiology, Paul et al, 2022

- ‘Many studies have shown no weight gain difference in broilers fed an AGP diet in the absence of health problems’

  Source: Withdrawal of antibiotic growth promoters from broiler diets: performance indexes and economic impact, Poultry Science, Cardinal et al, 2019

THE ECONOMIC COSTS OF WITHDRAWING ANTIMICROBIAL GROWTH PROMOTERS FROM THE LIVESTOCK SECTOR

by

Dr. Ramanan Laxminarayan at the Center for Disease Dynamics, Economics and Policy (CDDEP), Washington DC
and
Dr. Thomas Van Boeckel and Aude Teillant at Princeton University

OECD FOOD, AGRICULTURE AND FISHERIES PAPER N°78 © OECD 2015

Table 2. Production responses by livestock to antibiotic growth promoters (improvement compared with controls)

Species	Average daily gain	Feed conversion	Comment	Reference
Broilers	2.5-6%	1.5-3.5%		Swann, 1969
	2.0%	1.3%	Results from Swedish and Danish experiments performed in 1967-76 with 5-20ppm Zn-bacitracin	Elwinger, 1976
	2%	3%	Supplementation with Zn-bacitracin	Rosen, 1996
	4%	4%		Gropp and Schuhmacher, 1998
	3.9%	2.9%	Review of experiments led in the 1990s with avilamycin, avoparcin, virginiamycin, Zn-bacitracin	Thomke, 1998
	<1%	<1%	Study of 7 million broilers spanning 3 years (1998-2001)	Engster, 2002
Piglets (6-20 kg)	8%	4-6%	Estimates from data of studies conducted between 1980-1990	Gropp and Schuhmacher, 1998
	17%	9%	Review of experiments conducted between 1970-1990	Thomke, 1998
	16.4%	6.9%	Data from 453 experiments conducted between 1950-1985	Cromwell, 2002
	5%	1.4% (NSS)	Controlled trial of 24009 growing pigs	Dritz, 2002
Growing pigs (17-49 kg)	6-10%	5-7%		Swann, 1969
	9%	5.5%		Gropp et al., 1992
	10.6%	4.5%	Data from 298 experiments conducted between 1950-1985	Cromwell, 2002
Growing-finishing pigs (24-89 kg)	3.6%	3.1%	Review of experiments conducted between 1970-1990	Thomke, 1998
	4.2%	2.2%	Data from 443 experiments conducted between 1950-1985	Cromwell, 2002
	0%	0%	Controlled trial of 24009 growing pigs	Dritz, 2002

frontiers | Frontiers in Microbiology

ORIGINAL RESEARCH
published: 16 June 2022
doi: 10.3389/fmicb.2022.905050

Effects of Dietary Antimicrobial Growth Promoters on Performance Parameters and Abundance and Diversity of Broiler Chicken Gut Microbiome and Selection of Antibiotic Resistance Genes

Shyam Sundar Paul[1*], Savaram Venkata Rama Rao[1], Nagendra Hegde[2], Nicola J. Williams[3], Rudra Nath Chatterjee[4], Mantena Venkata Lakshmi Narasimha Raju[1], Godumagadda Narender Reddy[1], Vikas Kumar[1], Prakki Santosh Phani Kumar[1], Sathi Mallick[2] and Madhuranjana Gargi[2]

[1] Poultry Nutrition Lab, ICAR-Directorate of Poultry Research, Poultry Nutrition, Indian Council of Agricultural Research, Hyderabad, India, [2] National Institute of Animal Biotechnology, Hyderabad, India, [3] Department of Livestock and One Health, Institute of Infection, Veterinary and Ecological Sciences, University of Liverpool, Liverpool, United Kingdom, [4] Director's Lab, ICAR-Directorate of Poultry Research, Poultry Nutrition, Indian Council of Agricultural Research, Hyderabad, India

OPEN ACCESS

Edited by:
Bruce S. Seal,
Oregon State University Cascades Campus, United States

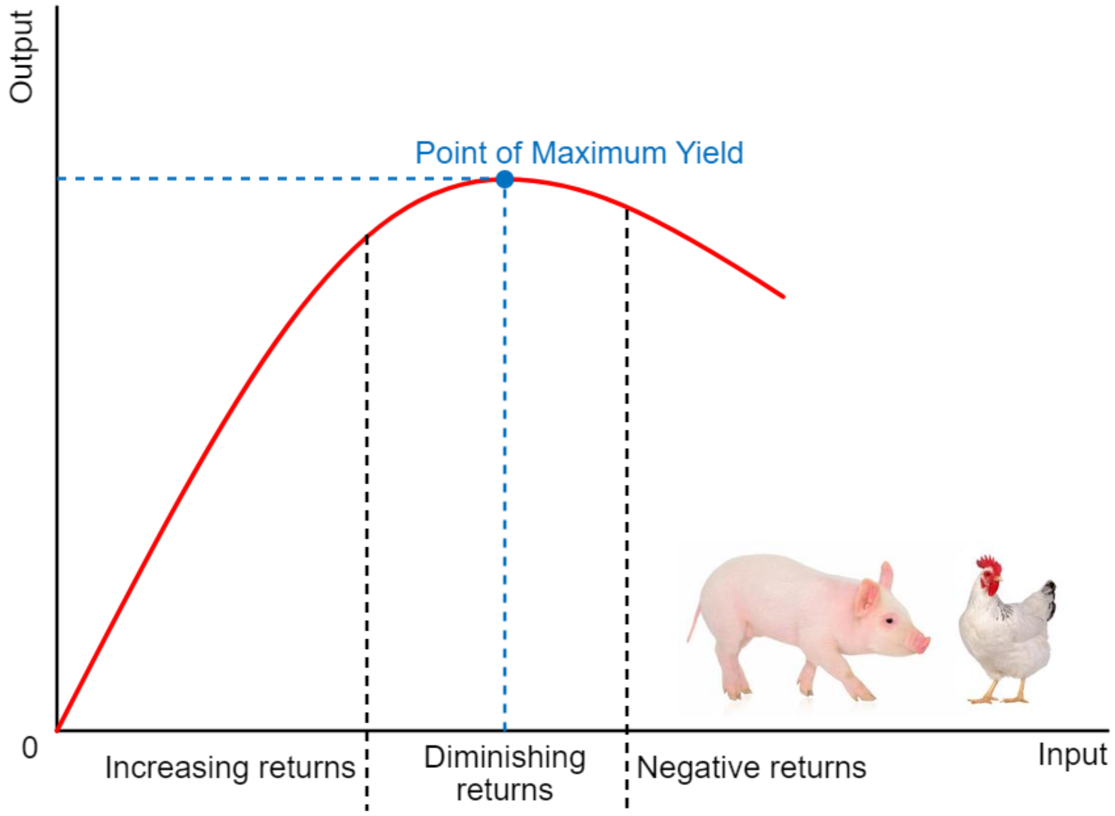
Reviewed by:

TABLE 1 | Effect of supplementing different antibiotic growth promoters on the performance of broiler chicken during three consecutive production cycles.

	C	V	CT	B	L	T	SEM	N	*P*-value
Performance during cycle 1									
1-14^{d}									
BWG	433.6	463.3	440.2	446.9	449.3	455.3	3.126	12	0.091
FE	1.106	1.086	1.112	1.095	1.129	1.126	0.008	12	0.616
1-21^{d}									
BWG	774.0^{c}	868.0^{a}	836.3^{ab}	808.3bc	828.7^{ab}	867.8^{a}	7.211	12	0.001
FE	1.193	1.165	1.202	1.213	1.239	1.214	0.007	12	0.070
1-35^{d}									
BWG	2007	2046	1994	2022	2013	2040	12.50	12	0.843
FE	1.342	1.387	1.379	1.374	1.371	1.383	0.010	12	0.837
Performance during cycle 2									
1-14^{d}									
BWG	412.0	434.2	418.2	434.8	427.2	419.0	3.99	13	0.489
FE	1.190	1.169	1.191	1.179	1.193	1.211	0.004	13	0.064
1-21^{d}									
BWG	854.2	880.6	856.2	860.4	878.6	825.5	7.826	13	0.368
FE	1.282	1.274	1.297	1.290	1.285	1.314	0.006	13	0.503
1-35^{d}									
BWG	2020	2016	2013	1960	1986	1931	18.76	13	0.701
FE	1.465	1.490	1.523	1.516	1.489	1.527	0.010	13	0.494
Performance during cycle 3									
1-14^{d}									
BWG	379.1	392.1	377.8	385.5	386.2	362.2	3.373	14	0.163
FE	1.279	1.273	1.280	1.269	1.293	1.280	0.004	14	0.671
1-21^{d}									
BWG	792.6	829.9	795.3	810.7	806.0	767.3	6.637	14	0.137
FE	1.385	1.366	1.375	1.393	1.397	1.393	0.005	14	0.489
1-35^{d}									
BWG	1842	1807	1834	1876	1833	1798	14.34	14	0.691
FE	1.622	1.679	1.604	1.617	1.614	1.601	0.013	14	0.570

V, virginiamycin (40 g/ton); CT, chlortetracycline(330 g/ton); B, bacitracin methylene disalicylate (500 g/ton); L, lincomycin (40 g/ton); T, tylosin (500 g/ton); BWG, body weight gain; FE, body weight gain/feed intake; P, probability, N, number of replicate pens; SEM, standard error of the mean; Means having common superscripts in a row do not vary significantly ($P < 0.05$).

The Current Situation of Animal Production



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Animal production
with less or no antibiotics???
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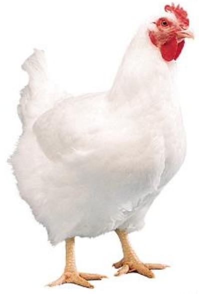
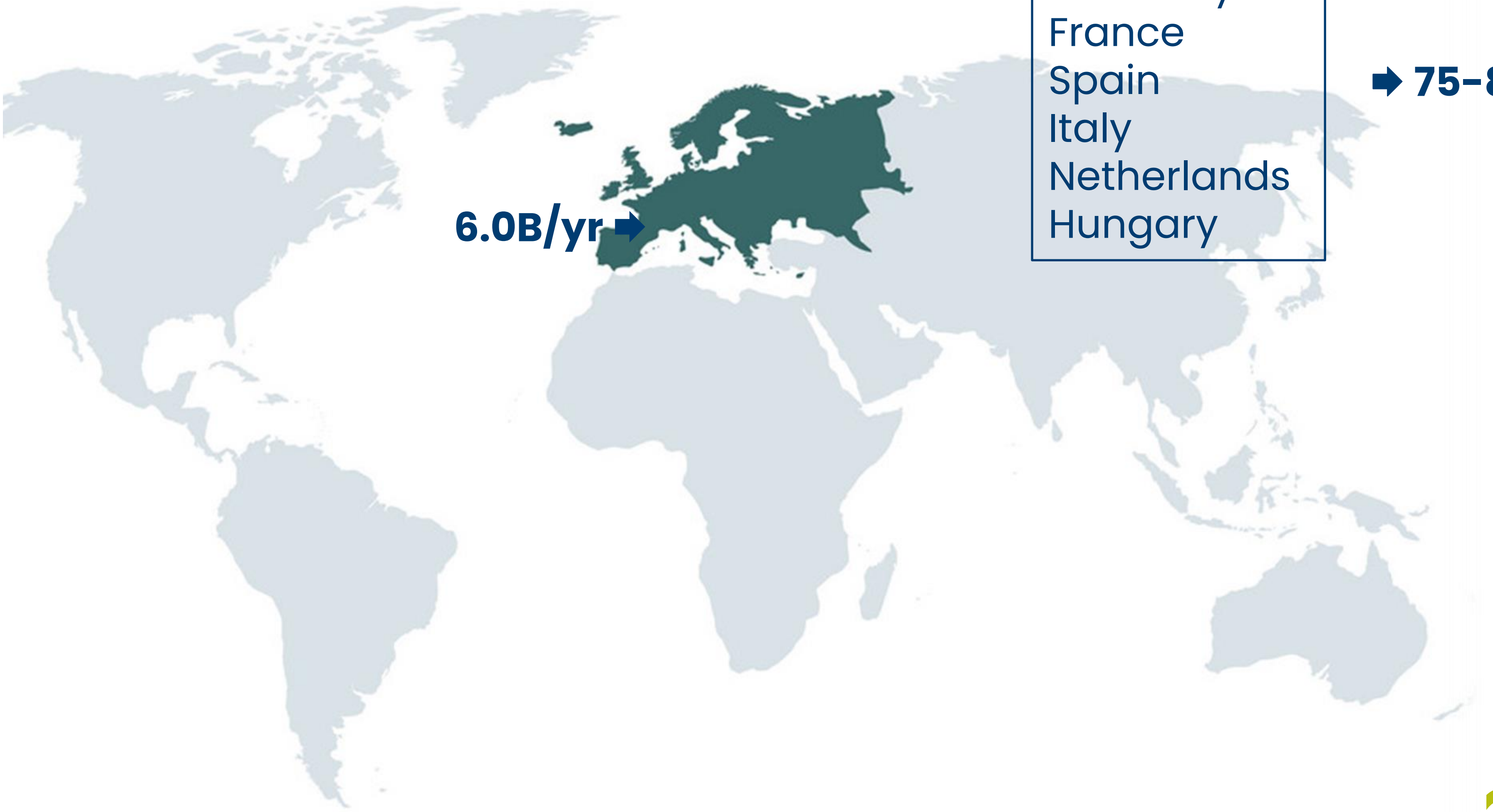
AGP Control from around the Globe:





6.0B/yr ➡

Poland (22%)
Germany
France
Spain
Italy
Netherlands
Hungary

➡ 75-80%

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Approved: 26 January 2024
DOI: 10.2903/j.efsa.2024.8589

SCIENTIFIC REPORT

Antimicrobial consumption and resistance in bacteria from humans and food-producing animals

Fourth joint inter-agency report on integrated analysis of antimicrobial agent consumption and occurrence of antimicrobial resistance in bacteria from humans and food-producing animals in the EU/EEA

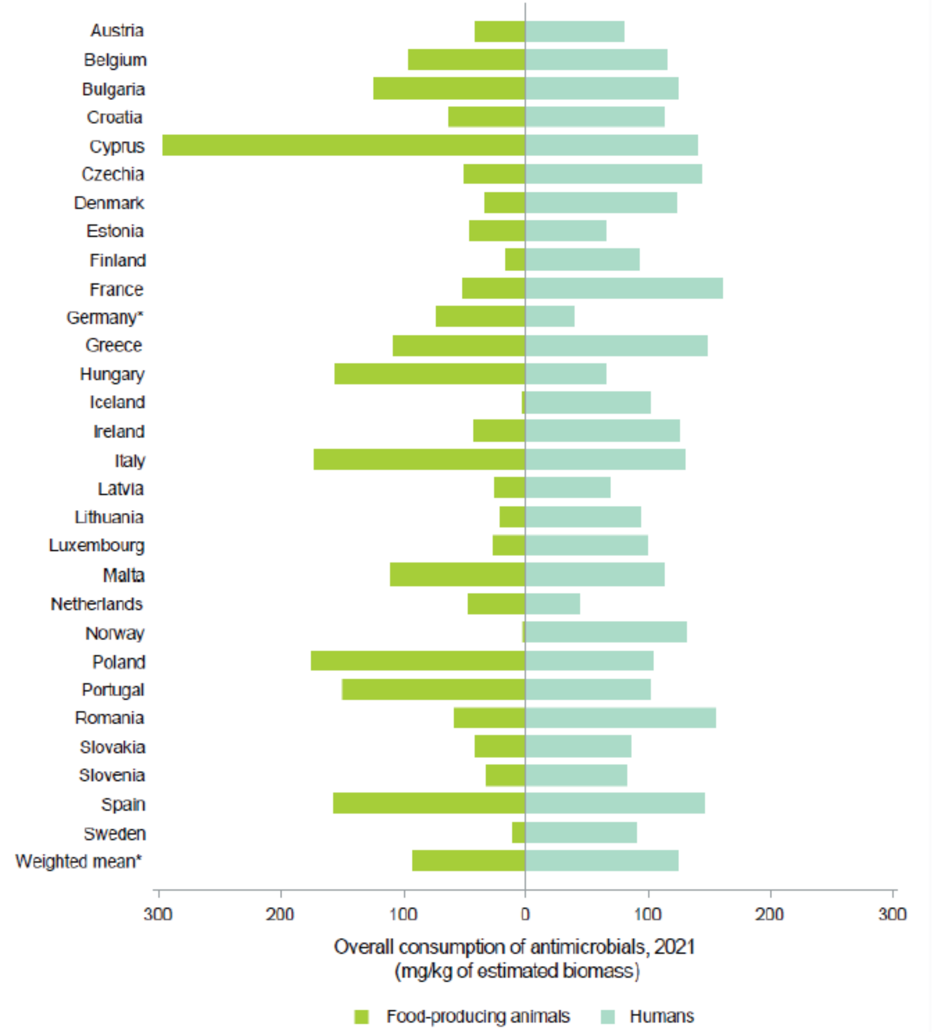

FIGURE 6 Comparison of population biomass-corrected consumption of antimicrobials[a] (milligrams per kilogram estimated biomass) in humans and food-producing animals by country, in 29 EU/EEA countries for which data were available both for humans and food-producing animals, 2021. An asterisk (*) denotes that only community consumption was provided for human medicine. The weighted mean represents the population-weighted mean of data from included countries providing total consumption (community and hospital sectors combined).

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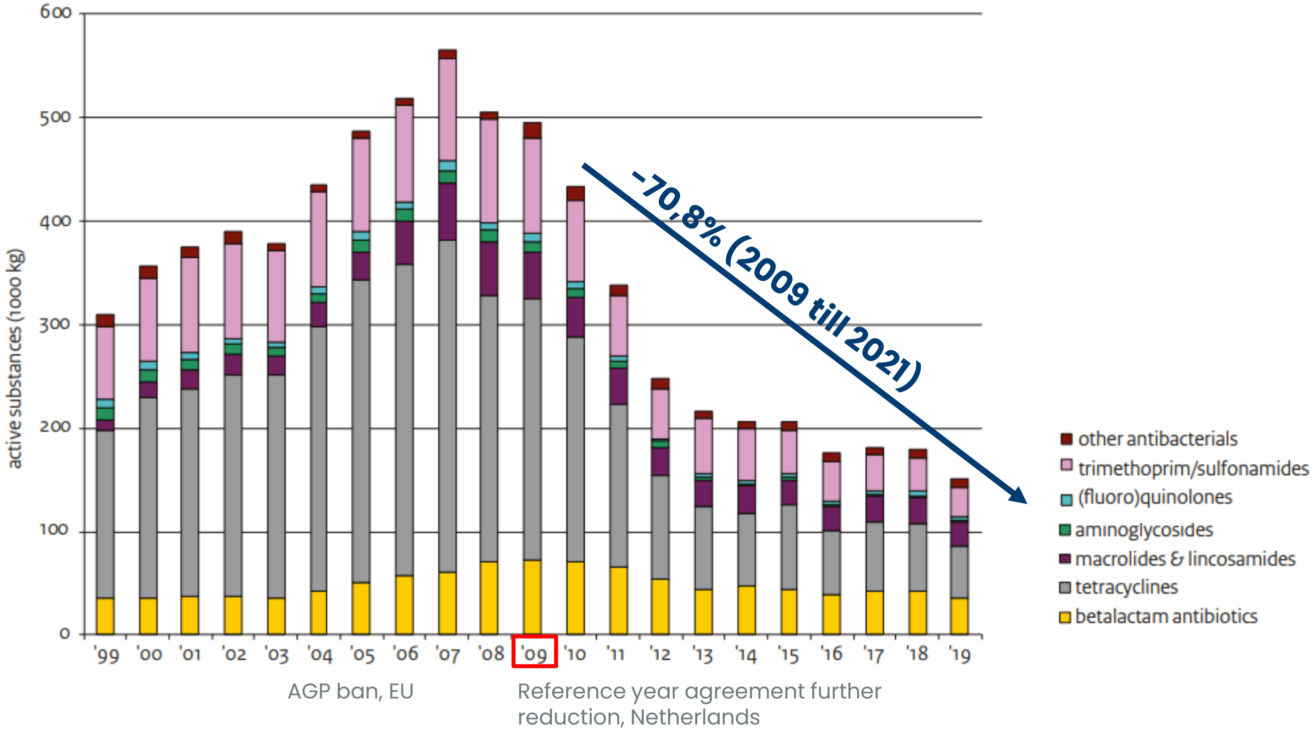
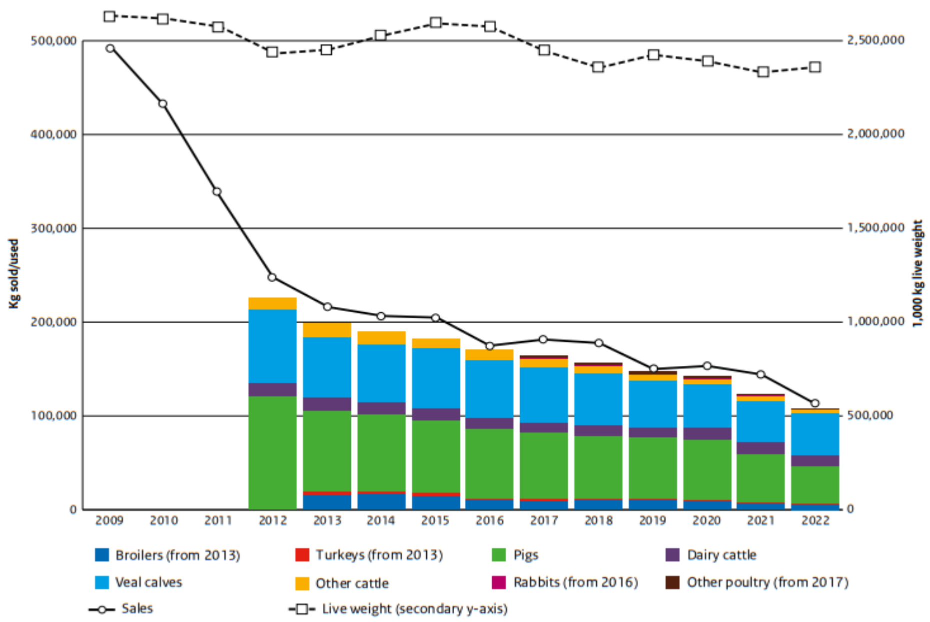
The Netherlands reduced antibiotics by 71%...



Antibiotic sales 1999-2019 in kg (thousands)

16

Figure 1 Mass balance of AVMPs sales data (black line, left y-axis) and use data (colored bars, left x-axis, kg), combined with total live weight of the food animal population (dotted line, right y-axis, 1,000 kg) from 2009-2022



MARAN 2023

Sources: Maran reports, Monitoring AMR and antibiotic usage in animals in the Netherlands
Graph left: Maran 2020
Decline till 2021, Graph right: Maran 2022

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For the Netherlands, this transformation resulted into increased performance, productivity and ultimately exports

Reduction antibiotic usage

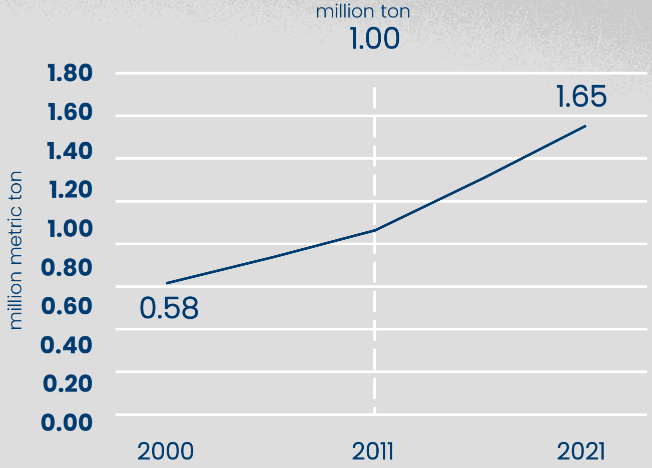
↓ 71%

antibiotic usage remained competitive and export kept growing*

Improved performance

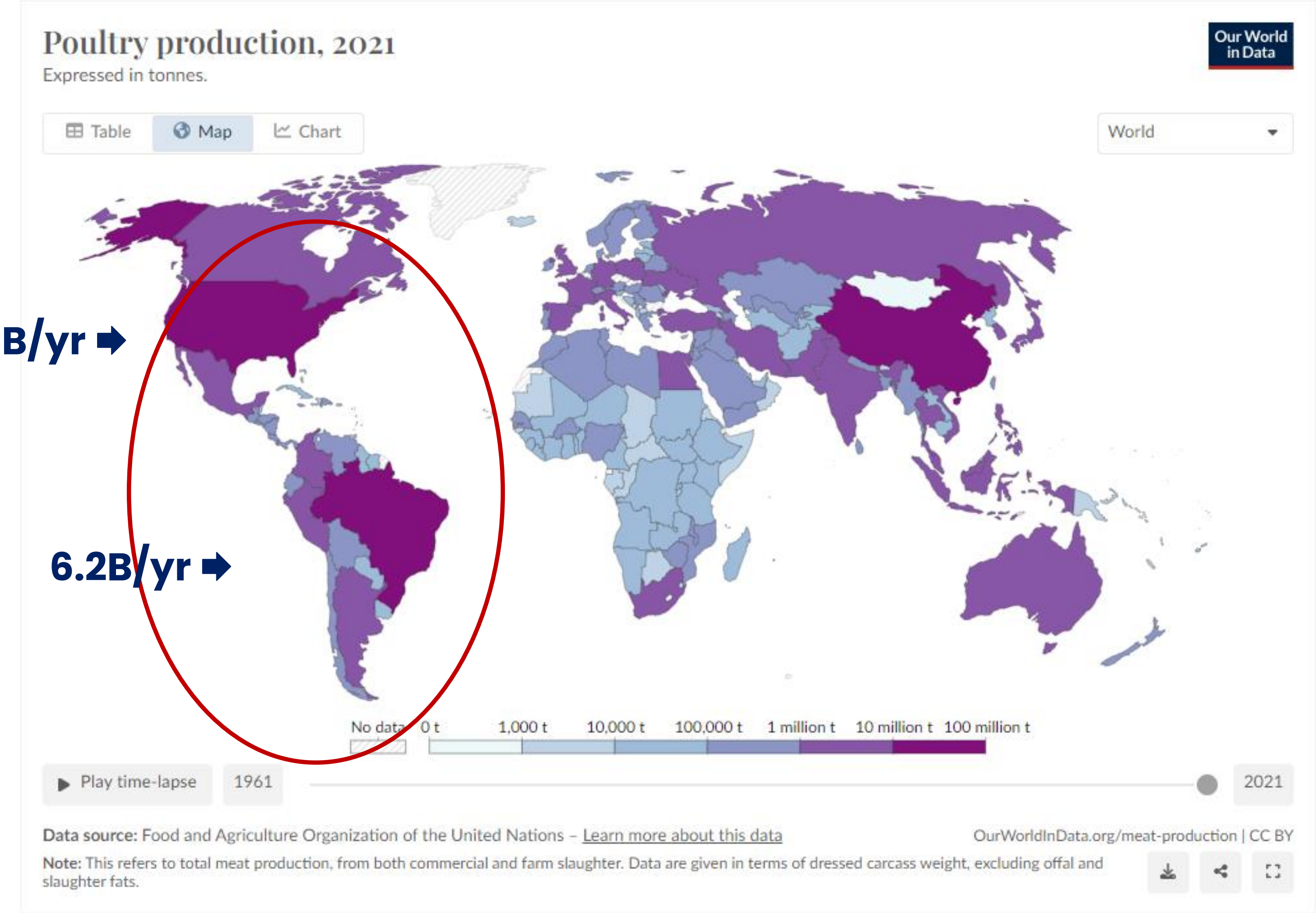
	2002 (AGP)	2009	2019 (-70% antibiotic usage)
ADG	54.5	60	61
FCR	1.73	1.66	1.61
Mortality	3.5%	3%	2.75%

Increased poultry meat exports



9.3B/yr ➡

6.2B/yr ➡



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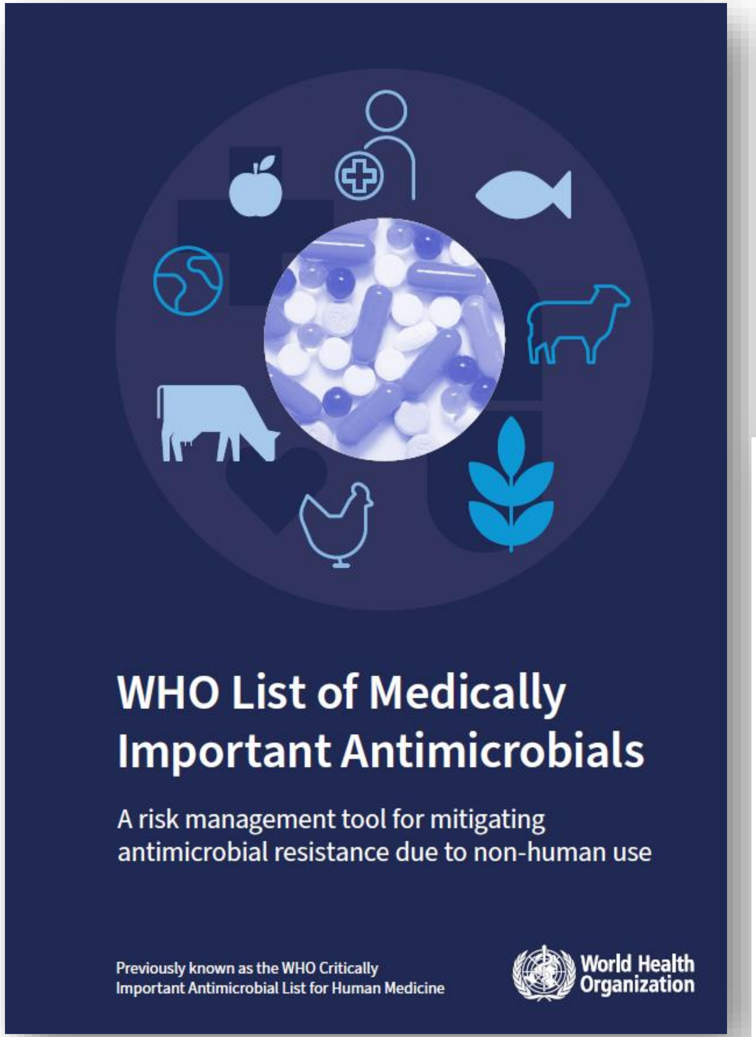
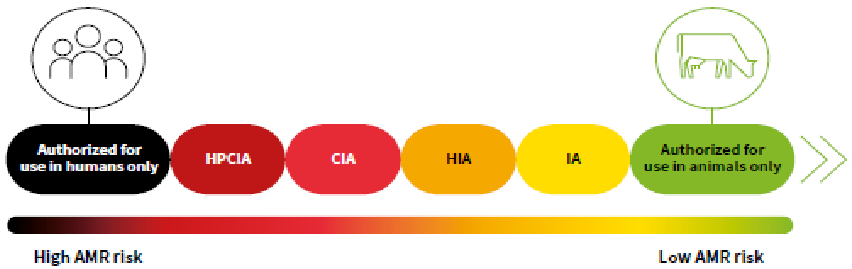
Source: https://ourworldindata.org/grapher/poultry-production-tonnes?time=2021



www.who.int/

Fig. 1. Prioritization of antimicrobial classes in the WHO MIA List



AMR: antimicrobial resistance; CIA: critically important antimicrobial; HIA: highly important antimicrobial; HPCIA: highest priority critically important antimicrobial; IA: important antimicrobial; MIA: medical important antimicrobial; WHO: World Health Organization.

Table 4. Categorization of antimicrobials not authorized for use in humans

NOT AUTHORIZED FOR USE IN HUMANS Not medically important for humans	
Aminocoumarins	novobiocin
Arsenicals	nitarsone, roxarsone
Bicyclomycins	bicozamycin
Halogenated 8-hydroxyquinolines	halquinol
Ionophores (including polyethers)	laidlomycin lasalocid maduramicin monensin narasin salinomycin semduramicin
Orthosomycins	avilamycin
Phosphoglycolipids	bambermycin (= flavomycin) flavophospholipol moenomycin
Quinoxalines	carbadox, olaquindox

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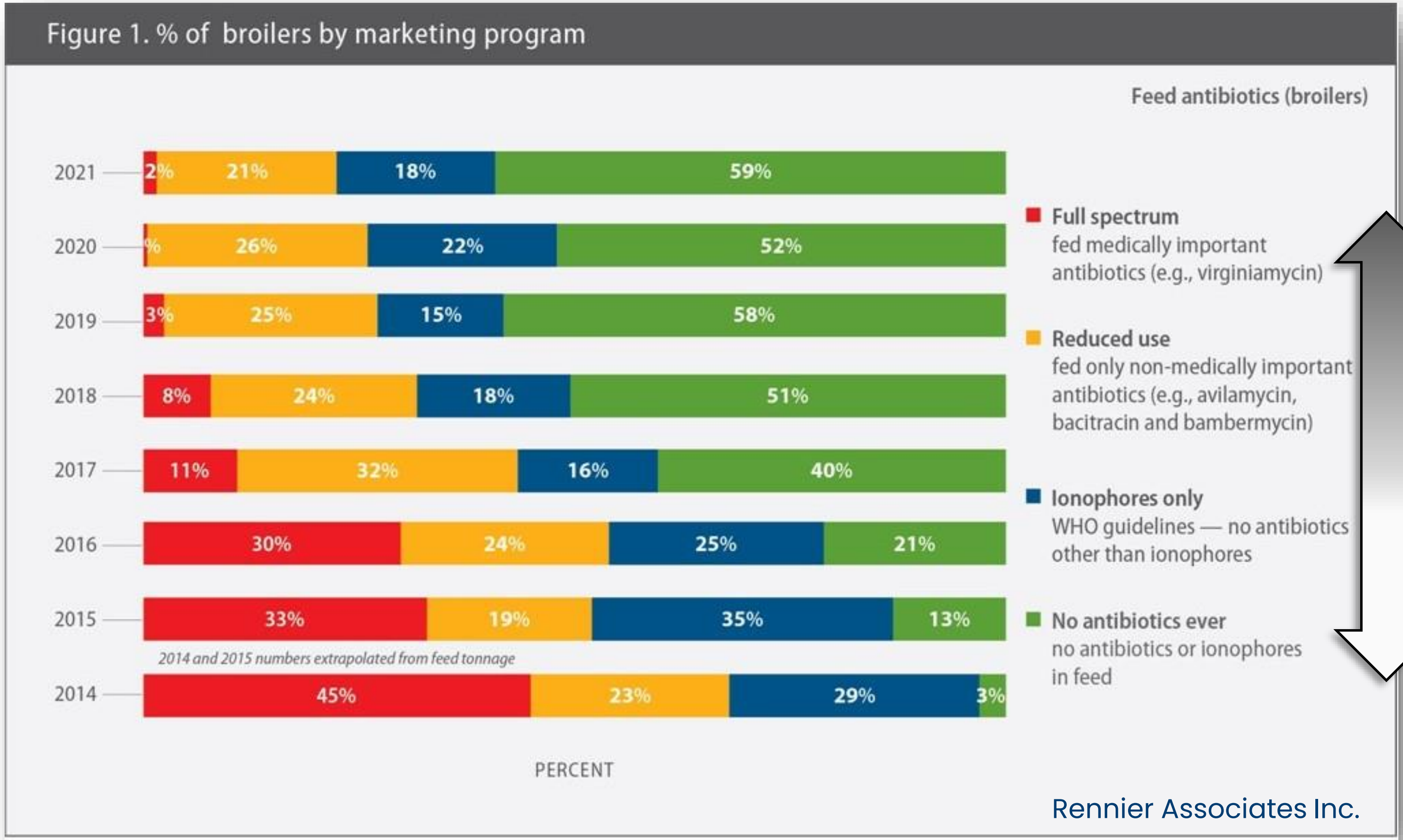
Consumer preference

Marketing/commercial opportunities



➡ **Conventional**

Avilamycin, Bacitracin, Bambermycin

Lasalocid, Narasin, Monensin, Salinomycin

➡ **NMIA/NAIHM**

➡ **NAE**

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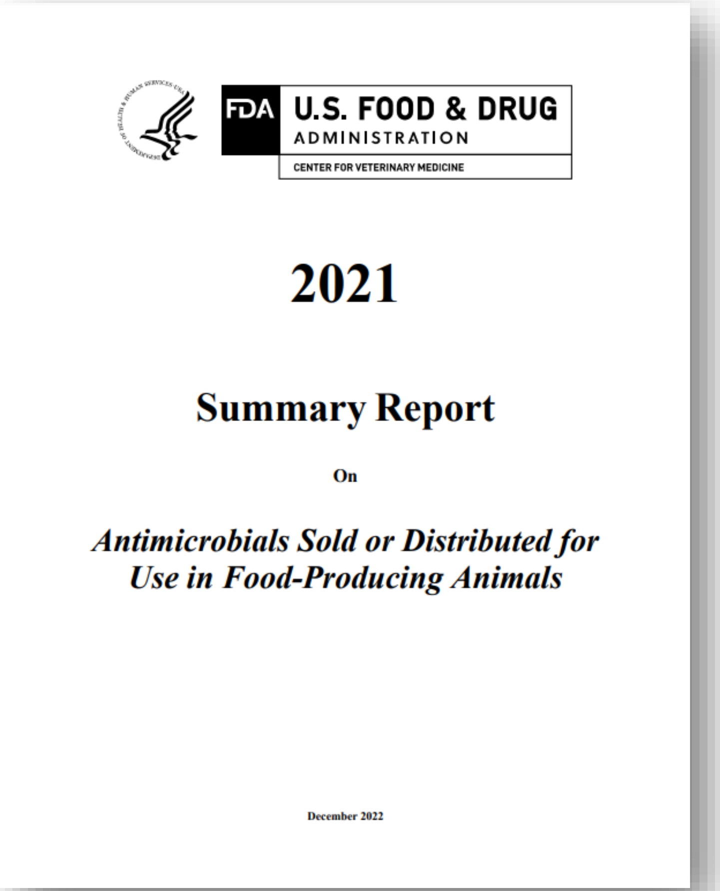
https://poultryhealthtoday.com/survey-shows-us-poultry-industrys-evolving-yet-flexible-approach-to-coccidiosis-management/


U.S. FOOD & DRUG ADMINISTRATION
CENTER FOR VETERINARY MEDICINE

2021

Summary Report

On

Antimicrobials Sold or Distributed for Use in Food-Producing Animals

December 2022

https://www.fda.gov/media/163739/download

Medically important[1] antimicrobial drugs approved for use in food-producing animals[2]
Actively marketed in 2021
Domestic sales and distribution data
Reported by species-specific estimated sales

Species	Estimated Annual Totals (kg)[3]	% Total
Cattle	2,460,766	41%
Swine	2,529,800	42%
Chicken	158,342	3%
Turkey	659,431	11%
Other[4]	181,383	3%
Total	***5,989,721***	***100%***

Not medically important[1] antimicrobial drugs approved for use in food-producing animals
Actively marketed in 2021
Domestic sales and distribution data
Reported by species-specific estimated sales

Species	Estimated Annual Totals (kg)[2]	% Total
Cattle	3,290,231	64%
Swine	612,622	12%
Chicken	983,331	19%
Turkey	226,721	4%
Other[3]	2,205	<1%
Total	***5,115,111***	***100%***

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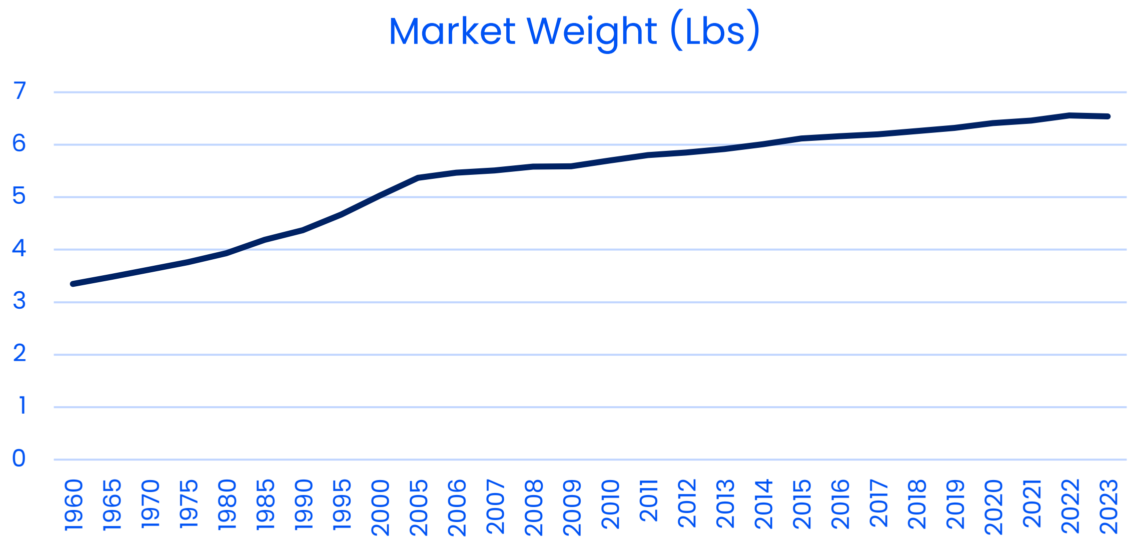
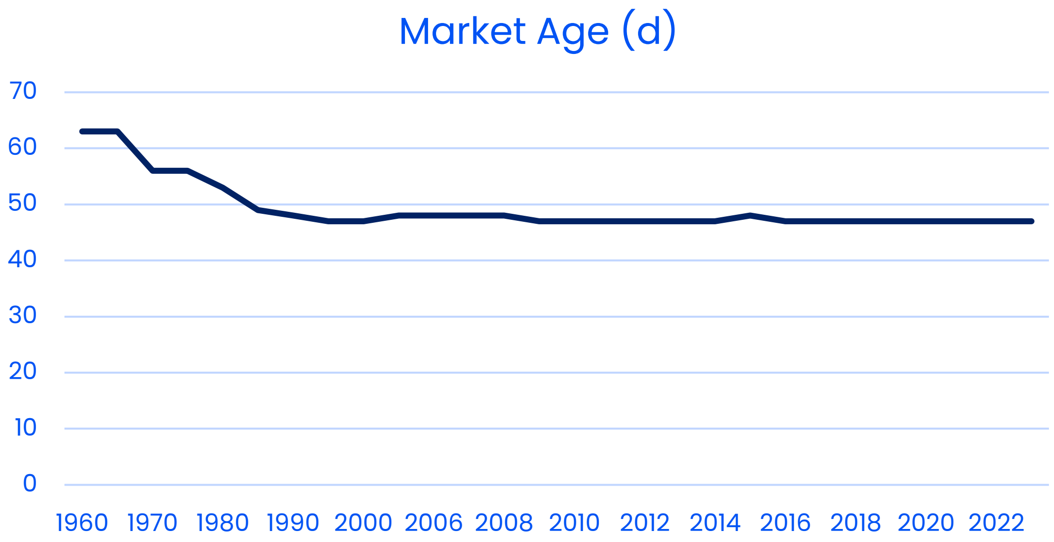
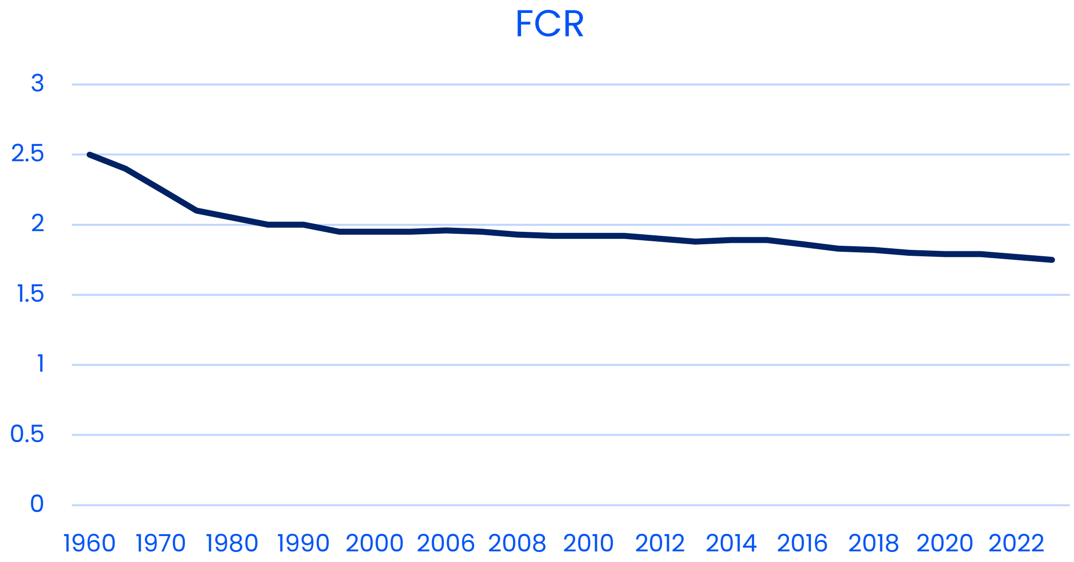
Historical Performance







Source: https://www.nationalchickencouncil.org/

What is happening in LATAM/Brazil?

brf

JBS

Aurora

With or Without Antibiotics

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Growth Performance

Health

Food Safety

Economics

Sustainability

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Safe & sustainable alternatives do exist, with proven efficacy!
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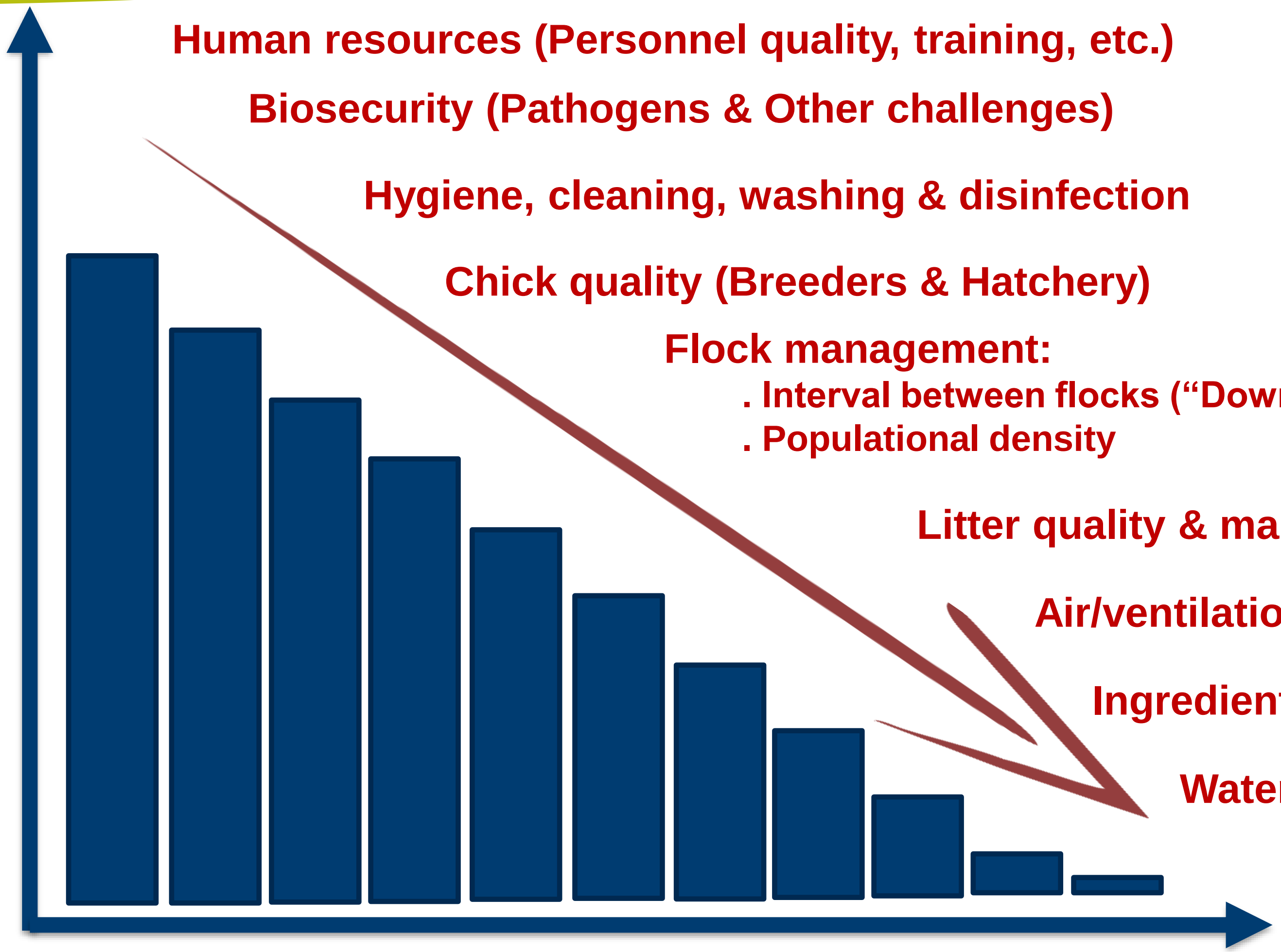
Impact of Antibiotics in Broiler Production



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Feed Additives (*Antibiotics* & *Non-Antibiotics*)

Antibiotics

Phytogenics

Oligosaccharides

Probiotics

Minerals

Organic Acids

Prebiotics

Symbiotics

Amino acids

Yeast

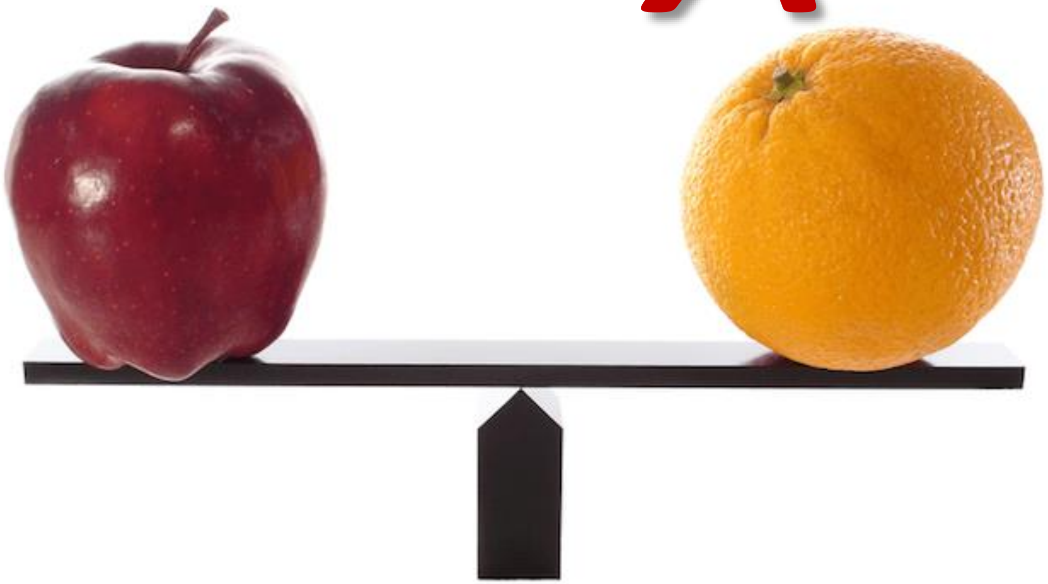
Postbiotics

Enzymes

Many others…

Plasma

“Antibiotic Alternatives”



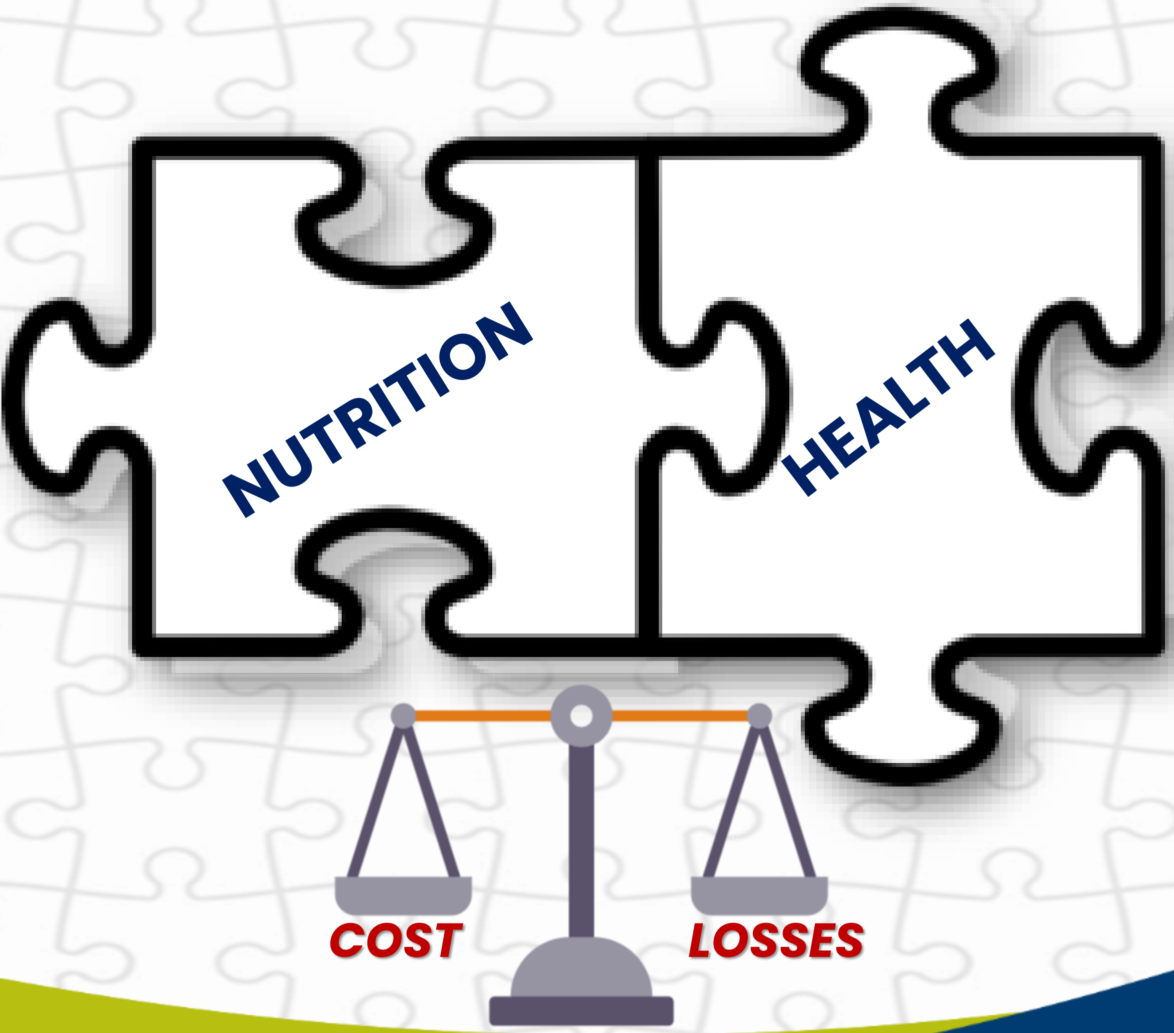
Different technologies
Different modes of action
Different approaches

How to use
When to use
Combinations

Animal Production Determinant Factors

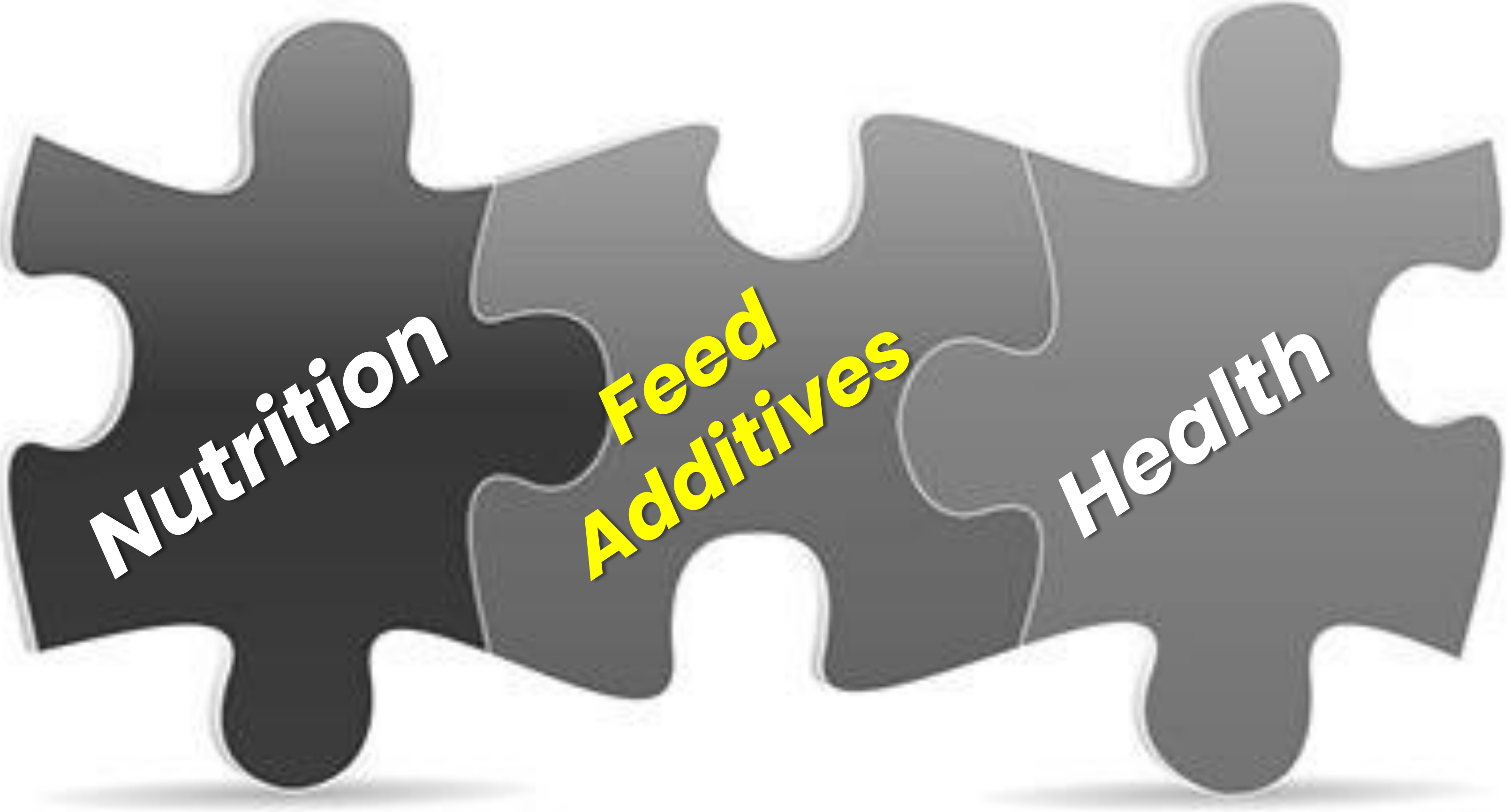
ENVIRONMENT

MANAGEMENT



PERSONNEL

FACILITIES



Productivity + Efficiency

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A Framework for Antibiotic Reduction in Animal Production:

- ✓ Biosecurity, biosecurity, biosecurity!
- ✓ Cleaning, washing & disinfection.
- ✓ Interval between batches/flocks/lots (also, litter management).
- ✓ Populational density & ventilation.
    - ✓ Vaccination program.
    - ✓ Breeders: nutrition & health.
    - ✓ Chick quality & 1st week (*"If it doesn't start well, it doesn't end well!"*).

- ✓ Personnel training & education.
- ✓ Inspections & records keeping are critical!
    - ↳ including rigorous control of therapeutic use of antibiotics!

- ✓ Feed & water quality/safety.
- ✓ Feed & water additives.

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What's in it for me?

Preserving a critical tool to protect…

…our animals,

… our workers,

…and ourselves!

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DOI: 10.1002/vms3.664

ORIGINAL ARTICLE

WILEY

Epidemiology and antimicrobial resistance of *Escherichia coli* in broiler chickens, farmworkers, and farm sewage in Bangladesh

Amit Kumar Mandal[1] | Sudipta Talukder[1] | Md. Mehedi Hasan[1] | Syeda Tanjina Tasmim[1] | Mst. Sonia Parvin[1] | Md. Yamin Ali[1,2] | Md. Taohidul Islam[1]

Vet Med Sci. 2022;8:187–199.

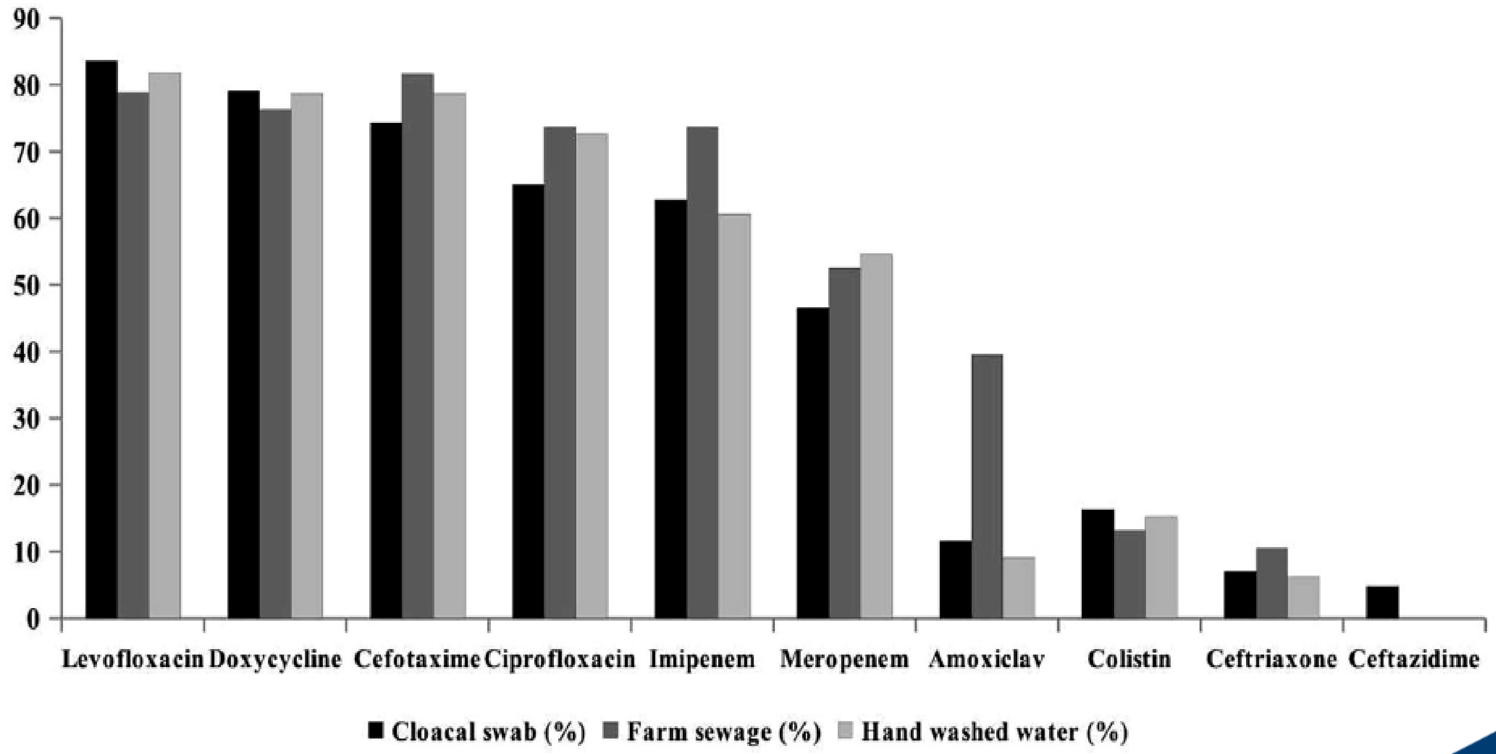

FIGURE 2 Resistance profile of *E. coli* isolated from three types of samples

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Think Differently!

Straight replacement of GPA's → **Eliminating the need for GPA's**

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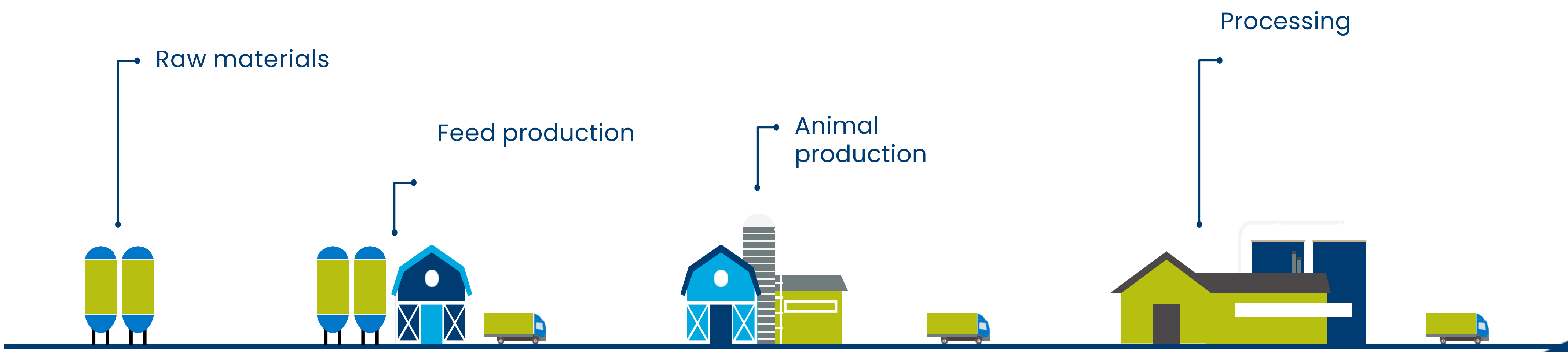
By implementing healthier alternatives across the full value chain



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Our Antibiotic Reduction Program Approach is designed on the latest insights and validated and perfected in practice.

Feed Management

- Microbiological quality of raw materials and feed
- Optimize Nutritional strategies
- Optimize Feed form and physical properties

Health Management

- Animal Health Monitoring
- Responsible Antibiotic use and targeted vaccination strategies
- Strategic use of Feed and water additives

Farm Management

- Biosecurity
- Farm Conditions
- Animal Management

Small switches Big change

Our Trouw Nutrition 5 step approach - **integrated, step-by-step, holistic approach** to make the "switch" to the responsible use of antibiotics easy and manageable

Small switches
Big change

Our Trouw Nutrition 5 step approach - **integrated, step-by-step, holistic approach** to make the "switch" to the responsible use of antibiotics easy and manageable

1. Profile
Specify your concrete, measurable (SMART) your antibiotic reduction ambition

2. Assessment
Assess your production from A to Z

3. Advice
Design a value-added program unique to you

4. Assist
Implement your customized solution

5. Evaluate
Measure your success

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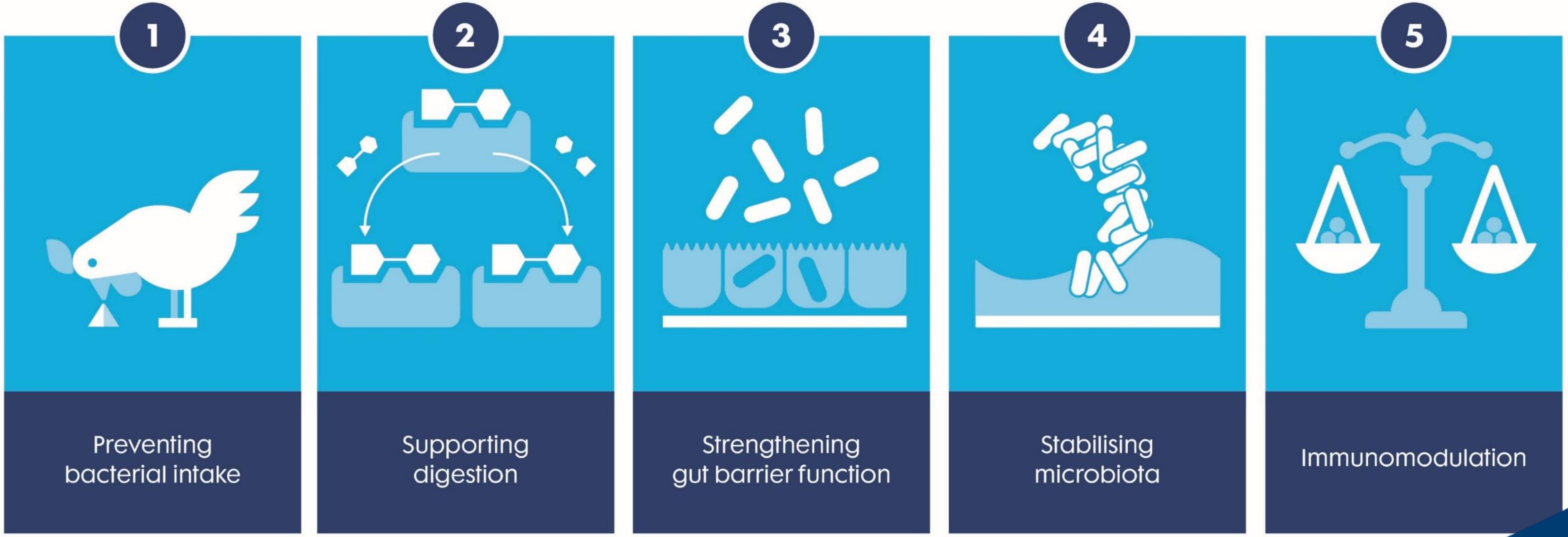
Our 5 pillars, to secure health & performance



We are committed to empower you to reduce the dependency on antibiotics.

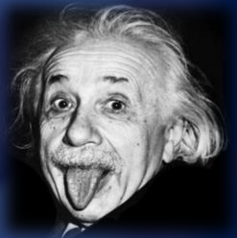
Small steps all together make a significant reduction.

One switch at a time!

- ***A "one size fits all" program does not exist or work!***
- ***It can, and it has been done! Many times!***
- ***Are you ready/prepared to do it?***

***"We can't solve today's problems
with the mentality that created them."***

Albert Einstein



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Thank you.

Allow us to be your Reliable Partner in your journey to

Get Future Ready...

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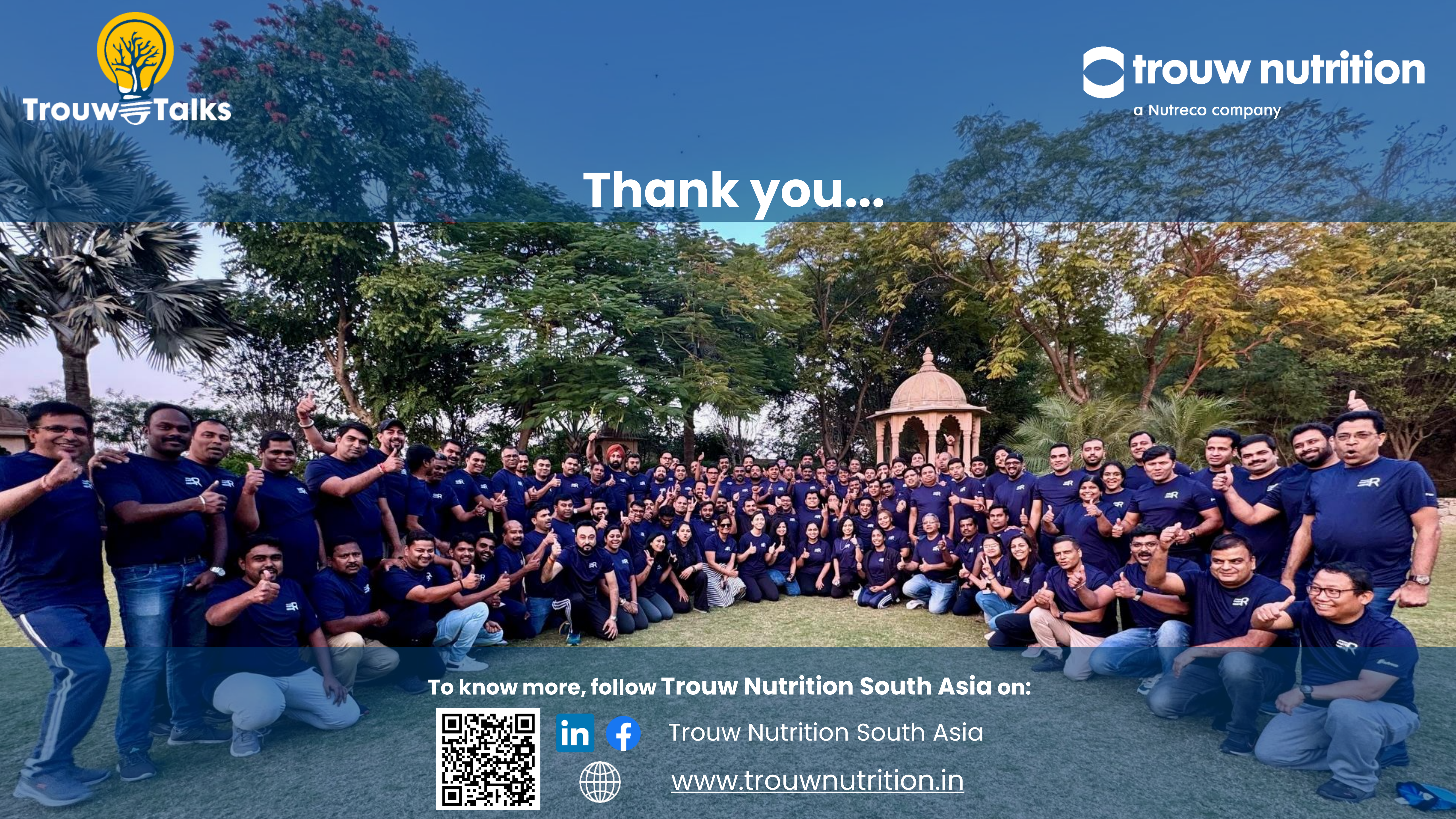
Thank you...



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