Responsibility of Food Animals Transferring Antimicrobial Resistance to The Human Population in Saudi Arabia

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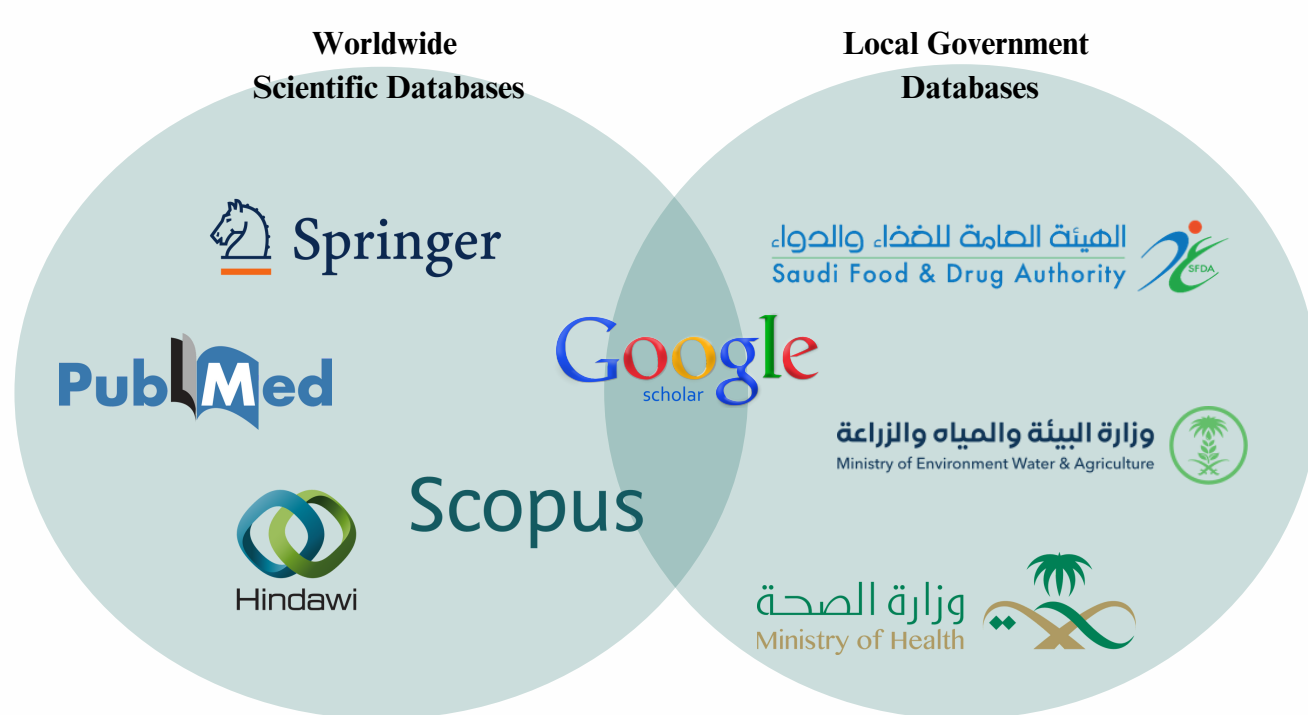Saudi Food and Drug Authority

1. Introduction:

Antibiotics are drugs used to inhibit the growth and activity of bacteria and other microorganisms. In the past, they used antibiotics as growth factors in feed and on live stocks to enhance growth and protect the animals from diseases. These excessive uses allowed the bacteria to gain and develop a defeat response against these antibiotics, leading to untreatable microbes. Consuming food from an animal source fed or treated with growth stimulants to induce health and improve production displays a similar structure to antibiotics used by veterinarians as a medical treatment that targets bacteria and fungi and raises the importance of the cause that led to antimicrobial resistance and its dramatic increase around the world.
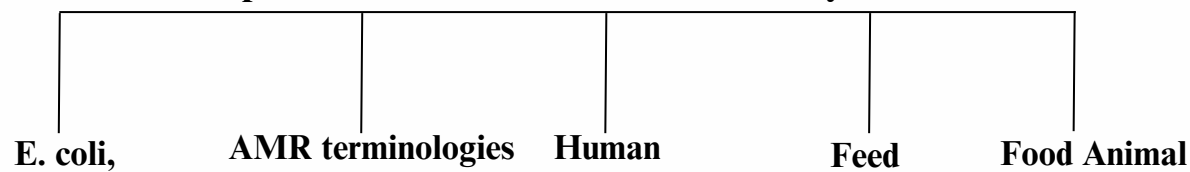
2. Objective:

Identification of the direction of the Antimicrobial resistance gene in E. coli and the transmission of antimicrobial resistance microbes along the food chain and the resources in the Kingdom of Saudi Arabia.

3. Methods:

Searches were carried out in multiple electronic databases:

Worldwide Scientific Databases — Local Government Databases

Articles published between 2013 and 2023, keywords:

E. coli, | AMR terminologies | Human | Feed | Food Animal

Food-Producing Animals.	Resistant for Antibiotic	Evidence	Reference
Cattel, Camels and Goats	Penicillin, Aminopenicillins, Cephalosporins,	Present in Hides and Feces	(Bosilevac Et Al., 2015)
Sheep	Penicillin, Aminopenicillins, Cephalosporins	Present in Feces	(Fathi Sharafa & Shabanaa, 2017)
Farm Chickens	B-Lactams Gentamicin Tetracyclines Streptomycin Chloramphenicol Erythromycin Sulfonamides	Positive Cloacal Swaps	(Abo-Amer Et Al., 2018)
Meat Products (Beef, Sheep and Chicken) From Saudi Arabian Ports	Penicillin, Aminopenicillins, Cephalosporins,	Present in Raw Meat Products	(Alhadlaq Et Al., 2023)

Table 1: Isolation of antimicrobial resistance E.coli from food-producing animals in Saudi Arabia

4. Results:

Figure demonstrates antibiotic resistance microbes transmition from farm to fork.

The studies showed the prevalence of E. coli strains and highly resistance antibiotic drugs in food producing animal in Saudi Arabia and their ability transmitted through food products by multiple evidence from reports around the world, first animal showed positive results by the present of E.coli with resistance gene in hides and feces, secondly the highly resistance antibiotic drugs ends up in human hands and ready to eat meat products, this is the result of excessive exposure to antibiotic which induces the virulence genes to resist to a large spectrum of antibiotic groups such as β-lactams, cephalosporins, macrolides, chloramphenicol, quinolones, and tetracycline and most first-line antibiotics.

Food-Producing Animals.	Highly Resistance	Evidence	Reference
Ready to Eat Meat.	Teicoplanin Tetracycline Amoxicillin/Clavulanic Acid Azithromycin	Antibiotics used by farmers have a link with the resistance pattern of bacteria isolated from the animals they use them on, which ended up in meat products. The RTE meats in this study were sources of resistant e. coli	(Abass Et Al., 2020)
Raw Meat Ready to Eat Meat	Amoxicillin Tetracycline Trimethoprim	Phenotypic resistance was higher in the human hands.	(Adzitey Et Al., 2021)
Chicken Meat Beef Raw Milk	Tetracycline Amoxicillin Ampicillin Sulfonamide	The results reveal the presence, in food products, of strains carrying virulence genes and resistant to the various antibiotics prescribed in human.	(Boudjerda & Lahouel, 2022)

Table 2: Evidence of antibiotic resistance to E.coli transmitted from food-producing animals to humans

The frequency of antibiotic resistance E. coli in food producing animal in Saudi Arabia is unknown, Stakeholders and researches face challenges in assessing the real threat by antimicrobial foodborne outbreaks primarily due to inadequate system of data collection and reporting. In the near future, treatment for E. coli infections will be highly difficult around the world if the frequently uses of antibiotics as therapy or as growth factor in food producing animal keeps going.

6. Conclusion:

we recommend incorporating monitoring and management of the antibiotics to help reduce the health risks associated with antibiotic-resistant E. coli strains from farm to fork, and the need to raise awareness among stakeholders, farmers, health staff, and the public to demonstrate the association of antimicrobial excessive use and the risk of being affected with highly resentence microbes. Surveillance studies in Saudi Arabia are needed to monitor the frequency of antibiotic resistance bacteria in food-producing animals and indicate the Probability antibiotic bacteria ends up in humans from food.

References