Antimicrobials in Agriculture

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Intensive Livestock Industry Development, Tamworth

Introduction

Australia’s response to antimicrobial resistance (AMR) adopts the ‘One Health’ approach, which recognises that human, animal and ecosystem health are inextricably linked and all play a role in managing AMR.

Australia’s approach to the use of antimicrobials in livestock production is one of the most conservative in the world. Nearly all antimicrobials used for animal treatments are Schedule 4 medicines meaning they must be prescribed by a veterinarian.

By comparison Australia’s use of antibiotics in human health is high compared to other OECD countries and is well above the OECD average.¹

Nonetheless, AMR is an important issue for treating livestock (disease) pathogens. Resistance has developed and continues to evolve in many bacterial organisms.

This situation is exacerbated by few, if any, new antimicrobial drugs targeting human or animal disease in the research pipeline.

In common with the global community, the Australian livestock sector cannot ignore the issue of antimicrobial resistance. It must respond to local issues squarely and, at the same time, meet its global obligations.

The Australian government has a dedicated website on the issue of AMR and this should be consulted for information on strategies and progress to address this serious threat to our health, our pets and our livestock. Australian Government’s AMR website

Definitions and History

Antibiotics are substances produced by one micro-organism to inhibit or kill another. In general, the term antimicrobial includes both the antibiotics and their synthetic cousins that will selectively kill, prevent or inhibit the growth of susceptible organisms.

¹ Responding to the threat of antimicrobial resistance; Australia’s first National Antimicrobial Resistance Strategy 2015-19 Australian Government
Over use or indiscriminate use of antimicrobial agents can lead to AMR. The first antibiotic known as penicillin was first discovered in 1928 but widespread use did not occur until the 1940s. By 1955, bacterial resistance to penicillin resulted in the restriction of penicillin use to a prescription only drug.

Resistance to antimicrobials has been occurring for decades. It is important to remember that microbes are living organisms competing with each other for survival. For the microbe, developing resistance to antimicrobials is a survival mechanism.

During the latter stages of WWII penicillin was first used to treat mastitis in dairy cattle. In 1946, streptomycin was first used and recognised as growth promoting when added to the diet of chicks. Post war food shortages and the recognition of the potential profitability of increased production via the use of antibiotics in livestock production quickly resulted in the increased world-wide use in intensive animal production.

Since the discovery of penicillin, scientists have been discovering new information about microbes and their function. The important role of commensal microbes in human health and well-being, as well as the very delicate balance of microbial ecosystems in the environment, are only now beginning to be understood.

**Antimicrobials and livestock production in Australia today**

The aim of antimicrobial use in agriculture is to restore health and through that maintain good animal welfare.

Until recently antimicrobial use (AMU) in agriculture had 4 main purposes:

- For the treatment of systemic infections (therapy);
- To prevent infectious disease at specific stages in livestock, pet and human health (prophylactic use). For example to prevent scours in piglets at weaning or the administration of antibiotics to people before or after surgery.
- To treat large numbers of animals when disease has been observed or expected to occur and where individual treatment is impossible or impracticable (metaphylactic use). This is a contentious issue amongst veterinarians.
- To stimulate growth rate and improve feed conversion efficiency (sub-therapeutic use).

The use of antimicrobials as growth promoting substances in agriculture has been the most controversial because of the risk of AMR and the potential for supply chain and environmental contamination with antibiotics or AMR microbes. Consequently, the Australian Pesticides and Veterinary Medicines Authority (APVMA) have withdrawn approval for the use for macrolide antibiotics for growth promotion in animal production. ²

² There is a phase out period until 5 April 2019 for some products. New labels will also urge veterinarians to consider “non-antibiotic-alternatives for treatment options”.
AMR can also develop in microbes in people who are using antibiotics. The incorrect use by doctors of antibiotics as a treatment for viral (non-bacterial) diseases such as the common cold is a good example of an indiscriminate use of antibiotics.

The Australian livestock industries continue to show leadership through the development of Antimicrobial Stewardship programs, while the Australian Veterinary Association is reviewing prescribing guidelines.

**Safeguards in our food supply chain**

Australian consumers are fortunate that “safe food” is a feature of our production systems, which are underpinned by a number of systems and regulations. These are:

- Veterinary prescription – most antimicrobials in Australian agriculture are classed as Schedule 4 drugs which means they can only be purchased with veterinary prescription.
- Withholding Periods (WHP – for the domestic market) and Export Slaughter Intervals (ESI – for export markets). All Schedule 4\(^3\) drugs have a WHP and/or ESI for livestock that have been treated with antimicrobials. The WHP and ESI are the period of time between the administration of the last dose of the antimicrobial and when the animal can be sent for processing for human consumption.

Farmers must withhold the animal/s from sale or slaughter for the period of time that is specified on the label of the antimicrobial. The WHP or ESI can range from several days to months, depending on the product used and the final marketplace. Through such measures, antimicrobial residues do not enter the food chain. Consequently, the potential for AMR in humans from a food source is minimised, and Australia maintains its ‘clean green’ reputation in both domestic and export markets.

- National Livestock Identification System (NLIS) – Australia has developed NLIS to identify and trace livestock in the event of a residue, food safety issue or an emergency animal disease.

All livestock that are sent to an abattoir for processing or sold at a saleyard, or to another farmer must be branded (pigs) or tagged with an NLIS device (pigs, goats, sheep and cattle). They must also be accompanied by a national vendor declaration (NVD) that farmers sign and declare that they have adhered to any WHP or ESI interval for any livestock treatment before sale.\(^4\)

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\(^3\) WHP and ESI apply to a range of veterinary medications and pesticides.

\(^4\) PigPass is the NLIS equivalent system for pigs.
Antimicrobials in Agriculture

- National Residue survey (NRS) – Australian livestock producers pay a transaction or slaughter levy to fund marketing, research and residue monitoring activities for their respective industry. The NRS undertakes random tests on selected livestock to determine evidence of residues from pesticides, veterinary medicines such as antibiotics, and environmental contaminants. NLIS allows trace-back to the farmer for any non-compliance. Australian primary producers continue to demonstrate a high degree of residue compliance and therefore, good agricultural practice.

Table 1: Industry results for the National Residue Survey 2017-18 show a continued high degree of residue compliance.

<table>
<thead>
<tr>
<th>Industry</th>
<th>NRS Compliance (%)</th>
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<tbody>
<tr>
<td>Pork</td>
<td>99.4</td>
</tr>
<tr>
<td>Beef</td>
<td>99.9</td>
</tr>
<tr>
<td>Sheep</td>
<td>99.7</td>
</tr>
<tr>
<td>Chicken</td>
<td>100</td>
</tr>
<tr>
<td>Eggs</td>
<td>99.4</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>100</td>
</tr>
<tr>
<td>Wild-caught seafood</td>
<td>100</td>
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</tbody>
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- Codes of Practice and Quality Assurance (QA) – All livestock and poultry industries operate within Codes of Practice and Quality Assurance (QA) or farm stewardship programs. QA programs involve annual audits of on-farm management by third party auditors. Such audits include assessment that producers use animal health products in accordance with label requirements. The livestock sectors have an incentive to ensure responsible antimicrobial use as AMR also impacts upon the effectiveness of such products in treating sick animals.

- Biosecurity plays a central role in Australia’s high health status in agriculture. Biosecurity is about keeping our animals, community and environment free of diseases, pests and weeds. Adoption of on-farm biosecurity programs protects the livestock, the business, our trading partners and our consumers. Australia is fortunate that many of the more serious livestock diseases and pests that occur in overseas countries do not occur here. Regulations enforced at the state and federal levels of
government provide the frame work for the high health status of our flocks and herds to be maintained.

**Antimicrobial Stewardship**

A collaborative antimicrobial stewardship (AMS) group has been formed comprising the livestock industry peak industry bodies Australian Pork Limited (APL), Australian Chicken Meat Federation (ACMF), Australian Eggs (AE), Dairy Australia, Australian Lot Feeders Association (ALFA), Meat and Livestock Australia (MLA) along with Dr Stephen Page (Advanced Veterinary Therapeutics).

AMS programs are being developed for each industry to ensure the ongoing responsible and prudent use of antimicrobials to minimise the risk of AMR.

Antimicrobial stewardship refers to taking business or personal responsibility for the careful and responsible management of antimicrobials. Responsible antimicrobial stewardship means using "as little as possible, as much as necessary" to ensure that high levels of health and welfare are present throughout the entire life of all humans and animals who might require antimicrobials to treat infection.

The Australian Veterinary Association and Animal Medicines Australia are working together to develop antimicrobial prescribing guidelines for livestock species and horses.

**Reducing antimicrobial use**

There is a misconception that large scale production systems cannot function without high use of antimicrobials.

Antimicrobials cost money and when any livestock producer examines their cost of production they know that livestock health is an important indicator of profitability. Healthy animals have better welfare, grow faster, use feed more efficiently, are more productive and don’t need health treatments such as antibiotics.

An important management tool for producers aiming to reduce the use of antimicrobials is greater attention to farm biosecurity. Biosecurity on-farm is the first barrier to disease entry.

Farmers are encouraged to develop on-farm biosecurity plans which incorporate strategies such as:

- Quarantine periods for newly introduced livestock
- Good fences and facilities to prevent straying stock or entry of feral animals
- Systems to ensure visitors report to the farm office before venturing further onto the farm
- Vaccination schedules for persistent and endemic (already on-farm) diseases
- Provision of animal feeds that meet the needs of the animal’s age and reproductive stage; for example, lactating animals have greater need for higher quality feed than gestating animals
• Minimising stress through provision of good environment (shade and shelter), nutrition, and handling
• Good working relationships with veterinary practitioners to get speedy and accurate diagnoses and appropriate treatments when things go wrong; but also, to explore avenues of treatment other than use of antimicrobials if they exist.

Most diseases spread animal to animal or person to person via direct contact, poor hygiene or contact with bodily fluids; some diseases are spread by biting insects.

It takes good management and attention to detail to maintain a healthy herd. But even the best farms can have some animals that get sick or injured, requiring the use of antimicrobial treatments. To do otherwise has a detrimental impact on the animal’s welfare.

The use, uptake and further development of vaccines will also be important to reduce the need for antimicrobial treatments with increased focus on disease prevention.

Antimicrobial stewardship programs that encourage responsible use of antimicrobials will be important to provide guidance to farmers and veterinarians. Livestock veterinarians are working on the development of prescribing guidelines for veterinarians on the use of antimicrobials for animal treatment.

The use of antimicrobials will be “as little as possible, as much as necessary”.

**Recommended reading for more information**

**Australian Government Antimicrobial Resistance**
- Australia’s First National Antimicrobial Resistance Strategy 2015-2019
- What you can do – factsheets

**Australian Pesticides and Veterinary Medicines Authority**
- Antibiotic resistance in animals

**National Residue Survey 2017-2018 Annual Summary** – this document describes the survey and the results for the 2017/18 year. Australian primary producers continue to demonstrate a high degree of compliance with Australian Standards.

**NSW DPI Policies and Procedures**
- Antimicrobial stewardship and resistance

**Industry organisations**

**Australian Chicken Meat Federation**
- Position statements – Antibiotics, Hormones

**Australian Eggs**
Antimicrobials in Agriculture

Australian Pork Limited

- Antimicrobial stewardship

Dairy Australia

- Australian milk residue analysis survey

Meat and Livestock Australia (beef, sheep, and goats)

- Antimicrobial stewardship

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