Poultry Africa focuses on antimicrobial resistance challenge

In October, VNU hosted their first event in Sub-Saharan Africa. It was called Poultry Africa and was held in Kigali, the capital of Rwanda. In addition to a successful exhibition, our poultry titles, in association with the World Veterinary Poultry Association, hosted two half day technical conferences that covered four topical themes and had speakers from five continents.

In this issue of International Poultry Production we focus on the first session that looked at antimicrobial resistance.

Separating facts from fiction

Edir Nepomuceno Silva from Brazil looked at some of the 'facts and fiction' of antimicrobial resistance (AMR) in poultry production.

He cited the recent statistical prediction that by 2050 there will be some 10 million human deaths per year associated with AMR, which equates to a death every three seconds, if the issue of AMR is not effectively tackled today.

There is an on going debate as to whether the AMR issues in man can be blamed on the use or misuse of antibiotics in food animals. However, it is now generally accepted that the use of antibiotics is the primary driver of AMR infections in humans.

However there have been some puzzling recent findings including the situation with regards to the emergence of colistin resistance.

This was first reported in November 2015 by the Chinese with the emergence of a new resistance gene (*mcr-1*) to polymyxins – one of the so called 'antibiotics of last resort'.

This gene apparently arose on Chinese farms between 2011 and 2014 and became widespread in animals with just a few isolations of it from humans.

The *mcr-1* gene is located on short free floating strands of DNA which can be easily copied and shared among bacteria. It is this which probably accounts for its fast spread in China and the world. In 2016 the gene appeared on farms in the USA and in the same country and year the first known E. coli infection resistant to colistin was reported.

A similar picture is seen in South America where the *mcr-1* gene is found in animal, human and environmental bacteria.

A retrospective study of enterobacteriaceae from the same three sample types collected between 2000 and 2016 showed that this particular resistance gene had been in South America from at least 2012.

Why did the *mcr-1* gene emerge on three different continents at the same time?

Edir then went on to consider the four ways antibiotics are used in poultry production, namely therapy, prophylaxis, metaphylaxis and as antibiotic growth promoters (AGPs).

In 2008 the AAAP issued a position statement on the use of antibiotic feed additives by the poultry industry (Table 1).

Table 1. Statement from the AAAP on the use of antibiotic feed additives by the poultry industry.

Antibiotic growth promoters (AGPs) as feed additives for commercial poultry ensures:

- Good enteric health by controlling Clostridium perfringens.
- Less environmental pollution because of less excretion of nitrogen, phosphorus, etc.
- A safer product for the consumer because of less salmonella shedding.
- Better bird performance through improvements in growth rates and FCRs.

- Increased detection of Clostridium perfringens and its toxins.
- Increased incidence of salmonella and campylobacter in the EU.
- Increased use of therapeutic antibiotics.
- No impact on improving antibiotic resistance.
- Adverse effects on poultry health and productivity.

Table 2. Initial consequences for the EU of banning AGPs.

In Europe, AGPs were banned in the mid 1990s, and the consequences that occurred in the early years after the ban was introduced are shown in Table 2.

However, AAAP changed its stance in 2016 and issued a revised position statement which stated '...antibiotic use must be minimised through carefully planned and well executed preventative practices' and 'there is a growing trend for some food retailers and restaurants to only offer poultry products from flocks raised without antibiotics'.

Consumer demand

The situation in many countries now is that antibiotic free production of poultry has become increasingly popular due to the consumer perception that antibiotic free poultry is superior to conventionally reared poultry, despite the higher price.

However, in terms of animal welfare, food safety and sustainability the following three questions are worthy of reflection:

- **Welfare:**

Do flocks get sick more often?

- **Food safety:**

Are the products safer for human consumption?

- **Sustainability:**

Is the cost of production higher?

All this has resulted in a lot of effort being put into the search for alternatives to antibiotics.

For some groups of product benefits have been found. For example, probiotics have been shown to have a preventative effect against salmonella and to improve bird performance.

This ability of probiotics to improve performance appears to be related to them being able to:

- Modify the gut microflora.
- Produce antibacterial substances including bacteriocins, colicins and others.
- Modulate immune responses.
- Specifically compete for adhesion receptors on the epithelium of the gut.

Another group is the prebiotics which exert their influence by serving as a substrate for beneficial bacteria in the gastrointestinal tract.

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Prebiotics are thought to work by producing short chain fatty acids and they can have a symbiotic relationship in the gut with probiotics. Some of the other groups of substances fall under the umbrella of 'eubiotic nutrition' and include enzymes and organic acids and the previously mentioned probiotics and prebiotics.

One definition of eubiotic nutrition is the combination of modern nutritional technology with the use of non-antibiotic feed additives to maximise feed utilisation by modulating the gut flora to hinder the proliferation of undesirable organisms in the gut.

Edir also forecasts that the global prebiotics market will soar from US$ 3.0 billion in 2014 to US$ 5.4 billion in 2020. Over a similar time span the global probiotics market is predicted to reach US$ 4.71 billion by 2021.

Chicken as a reservoir of AMR

In the second presentation on antibiotic resistance, Dr Mohammad Rafiqul Islam from Bangladesh highlighted some interesting facts on the subject.

For example, compared to a global mean of 66g per tonne of animal feed produced, the USA and China exceeded the figure with 74 and 86g respectively, whereas the EU was significantly less at 52g per tonne. By looking at the domestic consumption of chicken meat over recent years – 2013 to 2017 – he highlighted the potential important role for chicken as a reservoir and source of antimicrobial resistance.

This will be stronger in Asia where antimicrobial consumption by chickens is expected to grow by 124% by 2030. In India alone, intensive production of chickens at 30kg per m^2 is expected to grow by 312% by 2030.

This could well be of concern considering >50% of pathogenic E. coli are resistant to five key classes of antibiotic, whereas in the UK, Australia, the USA and South Africa, it is only one class of antibiotic.

He also highlighted the fact that many in the consumer lobby overlook that AMR does not have to come from meat and eggs. In Bangladesh multiple drug resistance was seen in 98% of bacterial isolates from raw vegetable salad samples.

Strategy for containment

In Bangladesh the National Strategy for AMR containment has the following as its key features:

- Establishing a multi-sector approach for planning and coordination of activities related to AMR.
- Promoting and ensuring rational use of antimicrobials.
- Promoting and strengthening infection prevention and control measures.
- Promoting and strengthening biosafety and biosecurity principles and practices and containment measures.
- To review, update and strengthen regulatory provisions.
- Institutionalising a surveillance system for AMR containment.
- Promoting operational and basic research.
- Continuing education in the area of AMR.
- Establishing advocacy, communication and social mobilisation (ACSM).
- Developing new antimicrobials and vaccines.

To address AMR, a tripartite approach was developed by OIE, WHO and FAO that has five strategic objectives:

- Improve awareness and understanding of antimicrobial resistance through effective communication, education and training.
- Strengthen the knowledge and evidence base through surveillance and research.
- Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures.
- Optimise the use of antimicrobials in human and animal health.
- Develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions. ■