health
POULTRY HEALTH CONFERENCE
Bangkok, Thailand 7-8 May 2019

Antimicrobial resistance (AMR) – The importance of avian mycoplasma control in decreasing antibiotic dependence

Chris Morrow and Robin Achari.

Antimicrobial resistance is an emerging problem and it is estimated that 10 Million people per year will die in 2050 if the current trends with failure to respond to antibiotic treatment continue. The emergence of resistant bacteria is basically driven by antibiotic usage. To prevent the development of resistance and its transference to human pathogens a one health approach is needed. We must decrease usage of antibiotics in humans, animals (food producing and pets) and contamination of the environment with antibiotics (in particular litter and effluent from antibiotic manufacturing factories).

Antibiotic resistance can develop in one bacteria and then be transferred to another (more pathogenic) bacteria. The resistance can develop in any bacteria; not necessarily a pathogen in the host being treated. The resistance may develop in a commensal in chickens and then eventually get transferred to a human pathogen. There is also a tendency for resistance factors to aggregate on transmissible genetic elements from bacteria to bacteria especially under continued selection pressure.

Although the most immediately dangerous causes of bacterial resistance are in the use and abuse of antibiotics in humans there is a need to make sure that animal use does not become the greatest source of the problem. It is also important that all countries participate in trying to minimize the development of resistance or else the efforts of agriculture in the western world will be for naught.

The FAO, WHO and OIE have put their heads together on this problem for a one health attack. The planned attack against the development of antimicrobial resistance involves greater control over the use of antibiotics (putting access under by prescribing by medical and veterinary control, developing prescribing guidelines, and the stopping of the use of some antibiotics in animals completely, In particular the use of antimicrobials for prophylaxis is recommended to be phased out.

The main uses of antibiotics in chicken production are prophylactic use of antimicrobials that exercise their benefits against MG and MS. Typically, these are programmes like administration of antibiotics for one week per month in layers and breeders or one day per week in layers. In broilers the use of antibiotics for the prevention of post vaccinal reactions (for example antibiotics at day 18) or to prevent respiratory (CRD) with administration to asymptomatic birds at day 20-22 are because MG or MS are triggering the symptoms.

Obviously one way to phase this antibiotic use out is to control mycoplasma by mycoplasma freedom or live mycoplasma vaccination with ts-11 and MSH. The development of antimicrobial resistance in avian mycoplasma is not much of a direct problem for human pathogens but responses to resistance like increasing doses used in prophylactic administration, using multiple antibiotics (tetracyclines and tylosin in combination), using antibiotics by routes of administration where they are not absorbed or only poorly absorbed (for example spectinomycin in feed or water will not have an anti-mycoplasmal action in the respiratory tract but will place selection pressure on the gut microbiota).

Live mycoplasma vaccines are sensitive to anti-mycoplasma antibiotics and the use of antibiotics will decrease the efficacy of the vaccine strain by altering its post vaccination population kinetics. Overlay a challenge with an antibiotic resistant strain and the effect of vaccination may be zero. Antibiotic resistance in avian mycoplasma is a local problem usually related to the historic use of antibiotics in the integration but in some areas with infections in source stock antibiotic resistant strains can be widely disseminated to the customer base.

The use of antibiotics in broilers can be greatly reduced or eliminated by the elimination (not the reduction) of vertical transmission of MG and MS. Other problems like ionophore use are not such pressing problems in Asian chicken production. Coccidial vaccines are being used to replace ionophores in the western world.

In summary if we can control mycoplasma then the necessity for the prophylactic use of antibiotics in chicken production can be eliminated. Unfortunately killed mycoplasma vaccines are not synergistic with live vaccines.