

Understanding Antibiotics

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An antibiotic is a drug generally used to treat infections caused by bacteria. Originally, an antibiotic was a substance produced by one microorganism that selectively inhibits the growth of another. For example, in 1926, Alexander Fleming discovered penicillin, a substance produced by fungi that appeared able to inhibit bacterial growth. Synthetic antibiotics, usually chemically related to natural antibiotics, have since been produced that accomplish comparable tasks.

Despite all of our efforts to keep our birds healthy through good husbandry practices and good biosecurity, it is inevitable that at some point a disease problem will occur on your farm. When this happens many producers immediately begin to medicate their birds with an antibiotic in the hope that this will restore the birds to a healthy state. Very often the drug choice is inappropriate and depending on the cause of the disease, for example a disease caused by a virus, the use of an antibiotic may not be warranted at all. Antibiotic misuse is leading to increasingly more stringent controls on over-the-counter antibiotic sales. Antibiotics have an important place in maintaining bird health, but they must be used carefully and judiciously.

Producers are encouraged to take the livestock medicine education program offered by the University of Guelph, Ridgetown Campus that fosters the safe use and handling of medicines on farm (www.ontariolivestockmed.com).

Improper use of antibiotics in livestock has been linked to drug resistance in pathogens affecting humans and the development of “Super bugs”. Human health concerns are driving new regulations on antibiotic use in livestock throughout the world. This problem is not restricted to commercial livestock, but is also a significant problem in back yard flocks, non-regulated poultry industries, our pets and even misuse of drugs in human medicine.

Bird producers should be aware of a number of important facts about the use of antibiotics:

- 1 Antibiotics are not effective against viruses, fungi, external or internal parasites. They are only effective against bacterial pathogens.
- 2 Every bacterial pathogen has a different sensitivity pattern to antibiotics, i.e. not every antibiotic is effective against all pathogens. The proper antibiotic has to be carefully chosen and this should be based on having first obtained an accurate diagnosis so that you know exactly what you are attempting to treat. A diagnostic laboratory can run antibiotic sensitivity panels on bacteria isolated from sick or dead birds. These sensitivity panels are the key to choosing the correct antibiotic for the problem. Consult your veterinarian to get a correct diagnosis and directions on the choice and proper route of administration of the antibiotic.
- 3 Using the proper dose and duration of treatment is critical. In order to be effective, critical target levels of the antibiotic have to be attained and maintained for a sufficient time to control the pathogen. If appropriate and consistent levels of antibiotic are not achieved it will be ineffective in treating the problem. Always give a full course of antibiotic treatment.
- 4 Bacteria can develop resistance to any antibiotic. This is usually the result of improper use of antibiotics. For example, using an ineffective antibiotic (i.e. the organism is not sensitive to it); by using too low a dose (i.e. below the therapeutic level); using the drug repeatedly at low levels; or by treating for too short a period of time. Antibiotic drug resistance and how it develops is a complicated story, but once drug resistance develops it can be transferred from one type of bacteria to another via gene swapping. Drug resistance problems can build up on your farm over time. If this happens then that class of antibiotic will no longer be an effective treatment option on your farm.
- 5 Zoonotic organisms (i.e. ones that can be transferred directly from animals to people) like *Salmonella* may cause significant human health problems. If these bacteria have also developed drug resistance, treatment options for humans become more limited.
- 6 Antibiotic resistance is becoming a larger and larger issue in human medicine with the development of “Super Bugs” that are resistant to multiple antibiotics. There are already “Super Bugs” in Canada that are resistant to all currently available and registered antibiotics for use in people. Woe to the person that becomes infected with these organisms. Pressure from Health Canada is increasing to regulate drug use in livestock production.
- 7 All antibiotics have an expiry date. Using old, outdated antibiotics will not effectively treat or control disease.
- 8 Antibiotics can be destroyed by heat and sunlight. Some require refrigeration. Improper storage of antibiotics renders them ineffective.

- 9 Antibiotic residues (either the parent drug or metabolites of that drug) will accumulate in the meat or eggs of medicated birds. Each antibiotic has a scientifically established withdrawal time (length of time for drug residues to disappear in meat or eggs after the drug has been removed) before the meat or eggs can be consumed. These withdrawal periods must be adhered to. Many people have drug allergies and residues are a serious concern. Drug residues in food also lead to drug resistance as discussed above.
- 10 The route of administration of antibiotics is critical. Some drugs must be injected, others can be used in the feed or water systems. Syringes and needles must be sterile. Many diseases are transmitted from bird to bird during the treatment if dirty equipment is used or if needles are not changed between animals. Many drugs are not soluble enough in water to remain dissolved and will precipitate out in the water. Some drugs have a bitter taste and birds will refuse to eat the medicated feed or drink the medicated water. Most water soluble drugs are destroyed by water bio-films or high mineral content in the water. Dosing birds in their water requires that you know the daily water consumption of your flock to calculate an accurate drug dose.
- 11 Antibiotics are used to kill bacteria. We should not be surprised that antibiotics can also be toxic to the birds if used at levels that are too high or used in the wrong age of bird. For example: tetracyclines used in young birds can cause bone development problems; chloramphenicol causes abnormal blood cell development in young, growing birds; sulfa drugs can cause serious kidney damage if used at too high a dose or in birds that are dehydrated.
- 12 A number of antibiotics and antimicrobial agents (including wormers and booster packs etc.) can be purchased at local farm supply stores. Farmers often medicate their animals themselves without knowing the diagnosis or the appropriate treatment. The misuse of antibiotics either by using the incorrect drug or using the wrong levels is extremely common in livestock farms in Ontario.
- 13 The sale of antibiotics is controlled. Certain antibiotics at certain dosage levels have been cleared for use in livestock feeds for growth promotion or prevention of target diseases and can be added by the feed mill. Using antibiotics at a dosage level higher than these accepted levels (i.e. using treatment or therapeutic levels) requires a prescription from your veterinarian.
- 14 Using drugs “off-label”, i.e. using it in ways that are different from the claim on the label of the bottle, must be done carefully as most drugs have never been tested in species other than chickens or turkeys. There are significant differences in how drugs are metabolized and therefore they have different toxicity levels and withdrawal times between species. The use of drugs off-label should be done under veterinary supervision only.



Conclusion

Based on the facts listed above, bird owners should be extremely careful on how antibiotics are chosen and administered to their birds. Antibiotics should be used only when necessary so they maintain their effectiveness.

Antibiotics should never be your “first line of defense”. Good husbandry, good biosecurity, rapid and accurate disease diagnosis and a solid disease prevention program is more effective in controlling disease than using antibiotics.

In certain provinces like Quebec, all drugs used in livestock require a veterinary prescription. This has not yet occurred in Ontario. Bird producers are strongly encouraged to seek the advice of their veterinarian when deciding on when and how to use antibiotics. There is strong national and international pressure to ban the routine use of antibiotics for growth promotion and disease prevention in commercial livestock production. Controls on antibiotic availability and sales will tighten over the next few years. Establish a relationship with your local veterinarian ... it will prove to be an asset in keeping your birds healthy.

SUGGESTED REFERENCES

Antibiotic / Probiotic Trends and Transitions in the Poultry Industry
<http://www.thepoultrysite.com/articles/706/antibiotic-probiotic-trends-and-transitions-in-the-poultry-industry>

Responsible Disposal of Unwanted Medicines and Sharps:
<http://www.omafra.gov.on.ca/english/livestock/animalcare/amr/facts/05-051.htm>

Feed Medications:
http://www.poultryindustrycouncil.ca/compendium-feed_meds.html

Water Medications:
http://www.poultryindustrycouncil.ca/compendium-water_medications.html

Antimicrobial Resistance:
<http://www.poultryindustrycouncil.ca/compendium-antimicrobial.html>

Antimicrobial Resistance in Agriculture:
<http://www.omafra.gov.on.ca/english/livestock/animalcare/amr/facts/04-081.htm>

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