

Re-emerging diseases in broiler breeding. What awaits us in the coming years?

Summary

Some bacterial diseases which are currently appearing are considered re-emerging since their casuistry was very low and are now having a large impact on the poultry industry, with the added factor that they are difficult to treat. Initially it was thought that they were caused by microorganisms that had mutated and become resistant to antibiotics commonly used with effective results.

The appearance of emerging diseases (previously undetected) or re-emerging (that have again become a threat) are of major concern for the world, both for the whole poultry industry and for health authorities, since some of them may constitute a threat to public health, as they can be transmitted to humans (zoonoses).

Current situation

Currently, the virulence with which these bacterial diseases arise, and their speed of transmission on and between broiler farms, can be devastating and cause serious losses, as broilers have a particular short breeding period.

The cost which can result is extremely high if you take into account not only death by illness or preventive slaughtering, but other aspects such as the cost of prevention, treatment, disinfection, diagnostic tests, meat price fluctuations and of course, last but not least, worse ratios.

Causes

Most of the diseases that can attack birds are of viral origin and have a strong immunosuppressive effect; these include **Avian Flu**, **Newcastle Disease (VVND)**, **Avian Leukosis virus** (subgroup J), **Infectious Bursal Disease (Gumboro Disease)**, **Infectious Laryngotracheitis virus** and the fearsome **Serotype D388 (QX) of Infectious Bronchitis virus**.

In recent years subclinical immunosuppression has occurred in vaccinated animals, where the animal has acquired good immunity towards the disease to which it has been vaccinated against, but the stress of producing specific defenses has created a transient situation of weakness in its immune system, and thus opening the opportunity to pathogenic bacteria.

These infections follow their course without observable clinical manifestations, but **cause a clear immunodeficiency that makes chickens vulnerable to any type of infection** given that their weakened immune system is unable to develop effective defenses, and thus, pathogens which in other circumstances would not normally be able to damage their health, act together with the rest of pathogens to sicken them.

Vaccines, vaccination failures and subclinical immunosuppression

Although there is no doubt in the usefulness of vaccines for their ability to prevent or lessen diseases, some limitations may occur, among them that they are specific to a single microorganism, and that pathogens, especially viruses, tend to mutate easily or create mechanisms of resistance which complicate their development.

It should also be considered that, sometimes, a **low response or a failure of the vaccine could be as a result of the deterioration of the animal's immune system, due to previous subclinical infections.** This aspect is important to consider, because a **good vaccine may fail because the immune system is not able to synthesize specific antibodies for its defense.** Subclinical infections do not show up, but their latent action **could weaken the animal's immune system significantly, and thus enabling the emergence of bacterial diseases.** In such cases the disease appears quickly, causing inflammation and exudates, and along with the weak immune response it complicates or nullifies the action of antibacterial treatment (Annex I provides other causes of the increase in pathogenicity of some bacteria).

Other circumstances

Changes in avian genetics. The industrial breeding of broiler has meant genetic changes in birds; the advances carried out in this field in recent years have been spectacular and fundamental for the development of the modern poultry industry. However, the risks of diseases may have a significant impact on efficiency since **the higher speed of growth and the improvement of performance parameters make the chicks more susceptible** to environmental factors such as cold or heat. Furthermore, they are affected by the action of pathogenic microorganisms such as the ones that affect their respiratory system, **especially if chicks do not start with a good genetic and a good immune system.**

Early vaccinations. To avoid infectious processes, new vaccination programs have been established to target bacterial diseases (such as Salmonella) and also introduced early vaccinations against viruses, 'in ovo' or during the first day of the chick's life. The increasingly short commercial life of the broiler has led to the vaccination programs being brought forward in comparison with years ago.

Conclusion

IN THE FUTURE, as a consequence of genetic improvements to obtain more efficient animals and faster growth, **A RISE IN EMERGING VIRAL DISEASES, MORE RESISTANCE TO TREATMENTS AND IRREGULAR RESPONSES TO VACCINES IS EXPECTED**, so it is easy to deduce that:

THE BEST WAY TO DEAL WITH EMERGING AND RE-EMERGING DISEASES IS TO ENHANCE THE BROILER'S IMMUNE SYSTEM.

Prevention is the best alternative. Enhancing an animal's immunity is the best way to promote its health and increase the profitability of the farm.

Responses to the challenge

- **Use of Promofeed**

Promofeed has proven to be an effective immunostimulant, as it produces more antibodies due to its ability to develop immune tissues (tonsils, mesenteric lymph nodes, etc.). Promofeed improves the response to the antigen, and then, vaccinations are more profitable.

Early vaccinations of the broiler, some of them with vaccines that could be called "semi hot", are aimed at developing immunity which has been transmitted by the mother. Hence the special importance of the immune status of the layer hen, to get a healthier egg and with more antibodies. **The importance of improving maternal immunity is therefore applicable to other species.**

The layer hen's immunity-producing organs develop during its growth period. To improve the hen's immune system it is necessary, during their raising period, to include a specific stimulant in its feed, for the growth of its tissues responsible for the immune system; "better factories" will have more capacity to produce antibodies in response to the vaccine or against the invasion of pathogens from external source. Greater capacity to transmit immunity to the embryo **will make the early vaccination of the broiler more effective.** If the chick has higher immunity, it will result in a clear reduction of cases of infectious diseases.

- **Increase in the protein and energy content in the animal feed**

In the post vaccination days and throughout the infectious processes, an extra contribution of amino acids or high digestibility proteins are necessary. Given the difficulty that would arise from providing a higher protein feed in such specific short periods, our recommendation in these circumstances is to give a boost of amino acids via drinking water.

In our tests of inoculations with *Salmonella* Enteritidis in laying hens (free from germs of this genus), in the clean environment of experimental farm and compound feed without bacterial inhibitors, we found that after infection these animals increased their feed intake. The reason is that in order to develop immunity-producing organs, animals need a energetic contribution, especially protein as it is the "builder" of organs, tissues and humoral immunity. In a situation of severe infection, with a restricted diet, the animals will allocate nutritional resources, which are normally needed for growth, for the development of its immune system. The organism decides: **first to survive and then grow**.

- **Treatment with antibiotics**

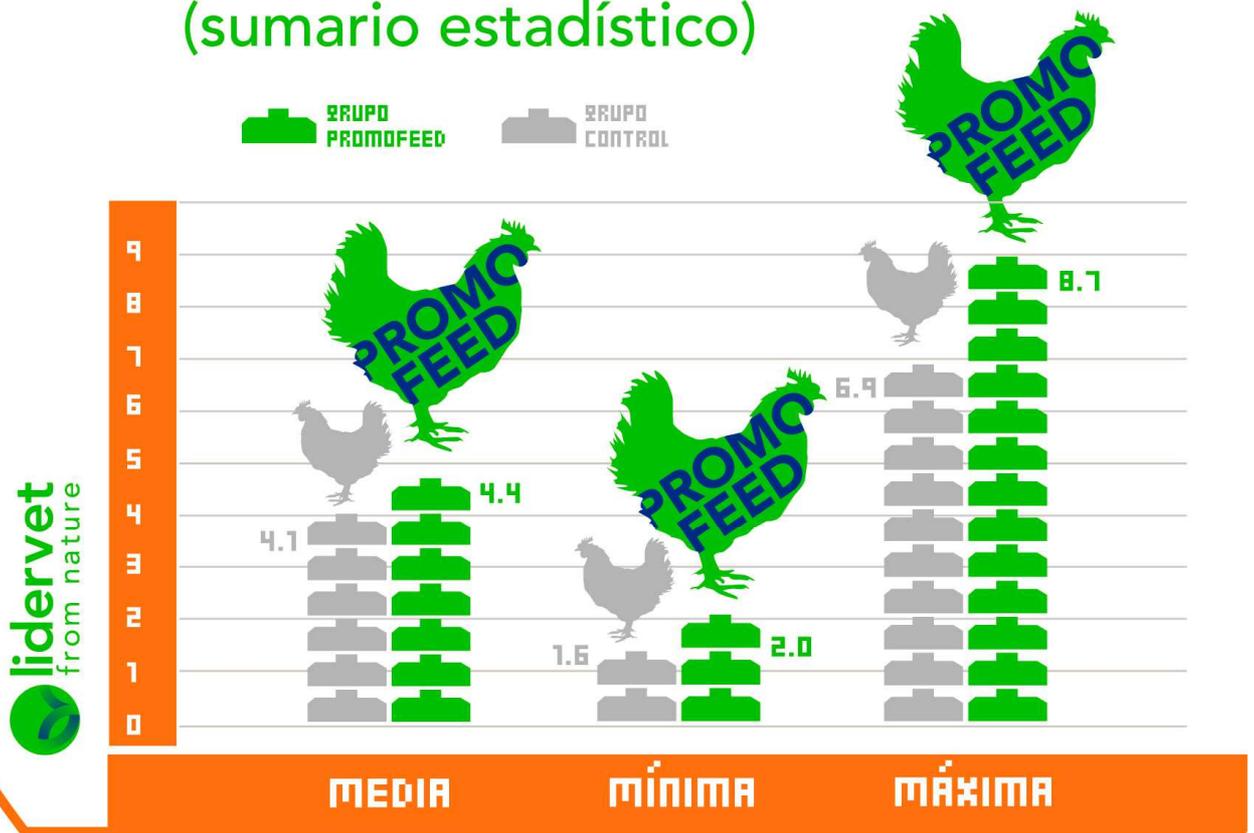
If withdrawal periods allow, the use of habitual antibiotics is recommended for the treatment of bacterial superinfections produced by opportunistic pathogens (Annex II shows why antibiotics fail).



PROMOFEED

Ensayo con 252 broilers realizado en Biopharm por cuenta de Lidervet, S.L. (año 2012)

Crecimiento de las Bolsas de Fabricio. Tabla de pesos expresada en gramos.
(sumario estadístico)



Con Promofeed se rentabilizan las vacunaciones, porque mejora la respuesta al antígeno

Promofeed es un producto de demostrada eficacia inmunoestimulante, dado que produce mayor cantidad de anticuerpos consecuencia de su capacidad de desarrollar los tejidos inmunitarios (tonsilas, ganglios mesentéricos, etc)

ANNEX I

Causes of the increase in pathogenicity of microorganisms.

To answer this question all factors and aspects that favor the occurrence of these diseases, hinder their treatment and produce complications, need to be considered: animals, pathogens, handling and environmental conditions.

Evolutionary changes in pathogens. Poultry pathogens tend to change and evolve. **Vaccination can accelerate the antigenic response which has already been determined by the animal's genetics.** Furthermore, pathogens also tend to change their protein structure to defend themselves from attacks from the immune system.

Combinations of pathogens. On many occasions, in various infections, apart from the main cause of infection there are other opportunistic secondary pathogens which participate, causing superinfections. Sometimes these pathogens, which can aggravate situations, have been known about for a long time, but others such as metapneumoviruses, have been discovered more recently.

Bird Handling. Poultry areas are often close to each other, and there is no doubt that **the distance between farms has an influence on the speed of spread of pathogens.** The **"Integrated production model"** in Spain can also facilitate the spread of an emerging disease when an outbreak appears, especially in poor biosafety conditions or if human errors occur.

Environmental conditions. High physical, microbiological and chemical pollution affects the health of the birds, which can easily become sick when their defenses are low. Situations of extreme heat or the presence of contaminated dust can complicate the post vaccine reaction. Likewise it is known that **some of the Low Pathogenic Avian influenza (LPAI) virus strains are capable of mutating under suitable conditions in to Highly Pathogenic (HPAI) viruses.**



ANNEX II

Main causes why antibiotic treatments fail.

- Incorrect diagnosis and the eventual election of an unsuitable antibiotic.
- Lack of diagnosis and subsequent treatment of a possible primary underlying disease (a very important factor which influences the therapeutic result).
- Antibiotic treatment of a viral disease.
- Incorrect route of administration or inadequate dosage schedule.
- The drug may suppress normal body defense mechanisms.
- Failure of the animal to absorb the drug.
- Failure of the animal's response due to a weak immune system.
- When superinfection exists.
- Resistance of the pathogens to antibiotics; it is the most common reason for failure.

Adapted from Duane N. Rice, DVM, Extension Veterinarian and E. Denis Erickson, DVM, Veterinary Microbiologist - <http://barnyardhealth.com/genlivin.html>

Furthermore, **although the treatment which has been selected is the appropriate, its application could also depend on the age of the animal and the withdrawal period of the drug.** This withdrawal period was the reason why the effective slow-acting sulphonamides were stopped from being used in broiler treatment, because they need a minimum withdrawal period of 20 days prior to slaughtering chickens.

Therefore, the use of antibiotics should be the last resort, and always pursuant to the law.

***"ANIMAL MEDICINE MUST BE USED AS LITTLE AS POSSIBLE,
BUT AS MUCH AS NECESSARY"***

Daniel Parker from Slate Hall Veterinary Practice. British Pig and Poultry Fair 2012. Workshop on antibiotic stewardship.