Industry trends (medication, vaccination, health management strategies in layer and breeder flocks)

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Introduction

Poultry meat and eggs are two major staple foods for the rapidly expanding population of the world. They both overcome religious restrictions, such as pork encounters, although still number one and could be considered ideal for supplying the protein requirements of the world. As such and due to the rapid market expansion, health and management needs have to be met, usually by improvements in vaccination and medication, so that the welfare and productive efficiency of the birds are maintained.

There is growing interest in the welfare of birds, especially layers housed in cages, and also other aspects of stocking density and transport. As a result of the over-usage of certain antimicrobial drugs, which are considered 'critical' for human use, e.g. fluoroquinolones and 3rd and 4th generation cephalosporins, and the concern regarding transmission of resistance to man from animals and food, the use of such products has now come into question.

This paper will review the trends of the poultry industry with special reference to breeder and layer sectors, regarding production, vaccination, medication and management changes.

Industry trends

The global chicken meat industry, mainly derived from broiler meat production, has grown by 19.2% over the five years from 2006-10 (FAO Stats, 2012) to 86.2 million tonnes/annum. Asia now dominates the world market, mainly due to China with its massive human population, followed by N. America and closely by a rapidly growing S. America. The US is the largest single market at nearly 17 million tonnes followed by China at 11.8 million tonnes. Brazil follows closely at 10.7 million tonnes.

The global egg market is 63.6 million tonnes (FAO Stats, 2012) (74% of the meat market) and growing more slowly at 9.5% over the 2006-10 period. Asia dominates, with China producing 23.8 million tonnes; the European Union (EU - 27 countries) is next with 6.7 million tonnes but there is little growth. North America is third at 5.8 million tonnes, with the US accounting for 5.4 million tonnes; it is still second in the world but there is almost no growth in the last five years.

Table 1. Global chicken and egg markets 2006-2010 (FAO stats, 2012)

Chicken meat (million tonnes)					**Eggs (million tonnes)**			
Region	2006	2010	Share in 2010 (%)	Change (%)	2006	2010	Share in 2010 (%)	Change (%)
World	72.3	86.2	100	**19.2**	58.1	63.6	100	**9.5**
EU	8.2	9.7	11.2	18.0	6.6	6.7	10.6	1.4
N. America	17.2	18.0	20.9	4.7	5.8	5.8	9.2	0.2
S. America	12.7	16.3	18.9	28.3	3.6	3.9	6.1	9.5
Asia	23.5	28.6	33.2	21.7	33.2	37.5	59	12.9
Total regions			84.3				84.9	

Table 2. Top 10 countries for chicken meat and egg production (FAO stats, 2012)

	Chicken meat 2010		**Eggs 2010**	
Rank	Country	Tonnes (million)	Country	Tonnes (million)
1	USA	16.97	China	23.83
2	China	11.84	USA	5.41
3	Brazil	10.69	India	3.41
4	Mexico	2.68	Japan	2.52
5	Russia	2.53	Mexico	2.38
6	India	2.3	Russia	2.26
7	Indonesia	1.65	Brazil	1.95
8	Iran	1.65	Indonesia	1.11
9	Argentina	1.60	Ukraine	0.97
10	S. Africa	1.47	Spain	0.84
Total		52.5 (61%)		44.7 (70%)

These figures confirm the importance of poultry products to feed the growing world and it is also significant that they have been growing, in spite of a global economic recession. Generally, chicken are considered the cheapest of the meats in comparison with pork, beef and lamb and eggs also offer exceptional value and are comparatively easy to access by most populations.

Trends in vaccination

Virus infections play an enormous role in poultry production. There are many viruses that can have a damaging effect on productive efficiency and also on mortality. Highly pathogenic avian influenza virus (H5N1) and Newcastle Disease (ND) are classic examples but often mixtures of infections such as infectious bronchitis (IB), Mycoplasma gallisepticum (MG) and Escherichia coli can all lead to a damaging effect on performance both in growth and egg production and also a spectacular increase in mortality.

Controlling diseases by vaccination programmes has been a major effort by the poultry industry. Replacement breeders and layers are heavily vaccinated during rear, normally against disease that are expected to occur or are a high risk of challenge. This varies from region to region, country to country and down to farm to farm level. Early vaccines are usually live and these are followed by killed vaccines for a final boost prior to placement for future breeding and laying. The programmes are meant to protect the birds during the whole laying period and also maternal antibodies are then passed on to the chicks to give them protection for the first few weeks of life, before their own vaccination takes place.

The production systems involved may also contribute to the spread of diseases, especially vertically transmitted disease such as viruses and Mycoplasma spp. The pyramid of breeding can permit the spread down to rapidly increasing numbers of birds, hence the need for good health protocols and vaccination programmes. Fertile eggs and chicks are also good routes of spread of virus strains both locally, internationally and intercontinentally, so reliable sourcing is key to health management. Still in many countries, good biosecurity, sourcing and disease management and control are not fully practiced.

Trends in vaccination are to fill the needs as they arise. As new virus strains arises, such as IB QX Chinese-like virus, either the old vaccines are used to try to offer cross-protection against the new strains but there are also opportunities for new vaccines to be developed and this is the case with IB QX (Pfizer/FD)but this takes time to achieve. In-ovo injection/vaccination from 18 days of setting has become more widespread and new vaccines have been introduced to take this opportunity of

mechanical vaccination, especially for Marek's Disease (MD) and also for infectious bursal disease (IBD) or Gumboro disease. Poly-vaccination with either multiple strains or against multiple diseases has been a feature of poultry vaccination to get enough in. Recombinant vaccines have also appeared using fowl pox (FP) or turkey herpes viruses (THV) as the host virus of another virus. This allows multi-vaccination without the possibility of reversal to virulence of vaccine strains.

Vaccination against avian influenza HP AI H5N1 has now been introduced to control the spread of this awful infection, which can kill humans (mainly women who handle the chickens) and also in some areas LP AI H9N2, which has become widespread in some areas, especially the Middle East.

Vaccines against Mycoplasma have also been developed. The live vaccines have been quite effective, unless under severe challenge, and recently there has been a new recombinant MG with fowl pox virus (Vectormune FP-MG – CEVA) which has been introduced in some countries. A new live temperature sensitive M. synoviae vaccine (Vaxsafe MS – Bioproperties) has been introduced and approved in the EU and other countries.

Medication changes/trends

Much of the news is negative regarding the use of antibiotics in poultry. In the US, the fluoroquinolones were banned in 2005 from poultry use given via the drinking water, because of the concerns regarding the development of resistance in zoonotic infections such as Campylobacter jejuni and Salmonella spp. Increasing resistance to E. coli was also noted. This concern is now spreading to the EU, after several years of respite, but the EU Commission is reviewing the situation. Also in the US they are considering banning the use of antimicrobial growth promoters. These were banned from poultry in 2006 in the EU.

Methicillin-resistant Staphylococcus aureus (MRSA) have also been found in poultry but this has been rapidly overtaken by the concerns regarding extended spectrum beta lactamases (ESBLs) produced by Escherichia coli following the extensive use of 3rd and 4th generation cephalosporins such as ceftiofur (Pfizer) (3rd gen). These have been administered 'off label' either in ovo or at day old by injection and even by spray to chicks prior to leaving the hatchery. In the EU, ESBL producing E. coli reached 30% in Spain in chickens and overall was higher than in pigs and cattle, where it was licensed for use. This has caused a large political storm and the use of antimicrobials in the EU is now being reviewed by the European Commission (EC) and hopefully we will find out their conclusions by the end of the year.

Supermarkets in the UK have exerted pressure on the producers to stop the use of fluoroquinolones and ideally all antibiotics in chicks, especially for the first 3 days, which was standard. As a result the UK industry is waiting to see what impact this might have on chick mortality but it has made producers look more carefully on their management practices to try to keep mortality low, especially during the first week.

While politically the EC say they want to control the use of antibiotics further, they are also keen to encourage the development of new antimicrobials. It is thought that this is unlikely in the current environment, which leaves opportunities to expand the development of existing products and molecules, mostly now generic, across the EU.

With the loss of the zero withdrawal period for eggs for the tetracyclines in most of the EU, which were widely used in layers, it has allowed tiamulin (Denagard – Novartis) to penetrate this market, where Mycoplasma spp and Brachyspira spp are frequently found. Elanco has also licensed tylosin (Tylan) with a zero WDP for eggs and Dopharma with penicillin V soluble too. Colistin is also available

in some countries for use in hens. Both tylosin and penicillin products can be used for necrotic enteritis, associated with Clostridium perfringens as well.

Health management trends

The major changes in Europe have been the switch from battery cages to either enriched cages or alternative systems such as barns or free range. In spite of it being a European directive, still several countries have no complied and are likely to be fined in due course. There are also calls for changes in the US and defensive action is taking place. Enriched cages do have some substantial benefits for the hen but it has been costly to change with approximately $30/hen being quoted.

Salmonella controls in layers and breeders have also been a major issue in the EU and targets have been set at 2% in layer flocks and <1% in broilers. Salmonella cases in man have been shown to be falling as a result by 69% from 2006-09.

With the removal of antibiotics, changes must be made to management of chicks to prevent mortality in the first week. This has involved looking at turnaround times (≤5 days increased mortality) floor temperatures (concrete temperatures <28°C also increased mortality above 1.5%). Attention to improving chick quality etc is also important, especially correct vaccination of the breeding stock.

In some countries we have seen the control of M. gallisepticum by the use of tiamulin (Denagard – Novartis) in feed programmes preventing vertical transmission. This has had a major impact on the health status of the broiler breeders where they have been at a high risk of infection from nearby units of other breeding or broiler flocks. Alongside a supply of MG negative breeding stock from Ross (Aviagen), this has enabled elimination from multi-age breeding and high risk sites.

Compartmentalisation on a national basis according to OIE, EU, and UK guidelines has meant that in the face of an AI or ND outbreak, provided that they can show that they are not directly involved – hence the compartment – breeding companies can continue to export. Thailand has also been involved with this regarding AI and fresh meat imports to the EU have been reinstated.

Conclusions

The poultry industry is a vibrant and vital industry to ensure the supply of meat and egg products to a growing world population. It has shown remarkable growth over the last 5 years and has had to face and adapt to a number of disease challenges. Vaccination programmes are a core strategy for controlling most viral diseases as well as bacterial and protozoal (coccidial) infections in breeders and layers. New vaccines either with new strains or with new improved technologies are going to be important.

The use of antibiotics as a prevention of disease is being challenged, especially with drugs, which are considered critical in human health care, whether they are therapeutics or growth promoters. This makes new antibiotic development uncertain for the pharmaceutical industry. It is felt that the development of existing molecules for new claims and smart registration can be utilised to improve the product range and meet customer needs. There is no doubt that there will be many new challenges and opportunities in the poultry industry and these must be met as the changing market arises.