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Resurgence of diseases in alternative models of production

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The author presents data upon diseases in alternative poultry production in France from field cases. The diagnoses are gathered by the vets of a poultry practices network mostly in the west part of France. Comparisons are made between diagnoses and isolated bacteria from free range to classical confined system. The discussion tries to investigate in what alternative methods may influence pathology.

Keywords: Free range; Poultry; pathology; Bacteria; Biosecurity

Introduction

In France, alternative models of poultry production have been being developed for many years. Poultry production is not only broilers, turkeys or laying hens, alternatives species has been produced such as ducks, guinea fowls, quails, and game birds. Beside the classical system of production, free range, "labelrouge", or organic take place in the market.

The aim of this lecture is to focus on diseases of alternative species or model of production and to details the influence of alternative methods on pathology.

Materials and methods

All the data shown are based on pathological cases observed in 2014 on commercial poultry farms in France mostly in its west part of the country. Diagnostics are investigated in a network of veterinary practices (40 consultants in poultry production) according to clinical signs, necropsy, and bacteriological examination. In some cases, viral investigation is carried on. This is not exactly an epidemiological study but it allows knowing the diagnostic of each consultation. The large amount of collected data (more than 10 000 examinations) gives the trend of pathology. The age of birds is registered in weeks (week 1 = age from 1 day old to 6 day old, week 2 from 7 days to 13 days and so on).

Clinical examination and necropsy: All the results are collected with the same procedure for all the vets and key-words for lesions and diagnostics are gathered in a data base.

Coccidiosis diagnoses are made after en post mortem examination and scored according to Ried and Johnson [1]

Bacteriology sampling and identification are carried out at the veterinary laboratories of this network according to common way of doing bacteriological examination [2] [3].

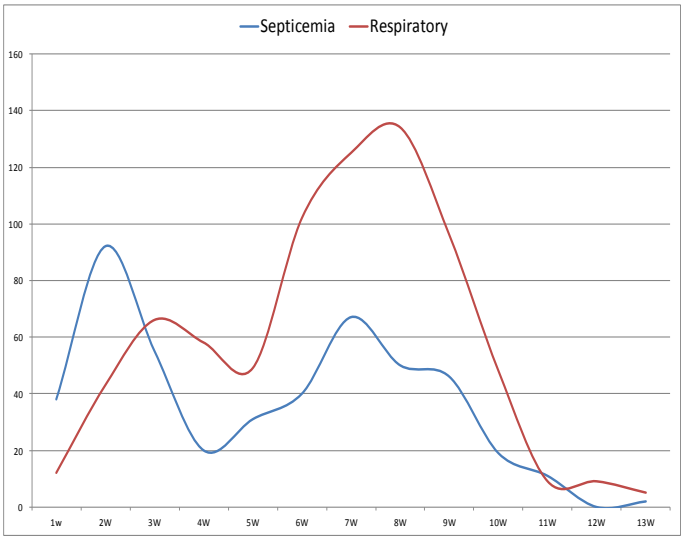
Viral investigation by serology, PCR, HI tests and histology are sent to specialized labs.

Results and discussion

Focus on bacterial diseases of Muscovy ducks

In 2014, among the 1526 cases observed in our veterinarian network, 80 % were bacterial disease. Within those cases 64% were respiratory infections, 29% were diagnosticated as septicemias.

Figure 1. The age of examination leading to a respiratory diagnostic or septicemia



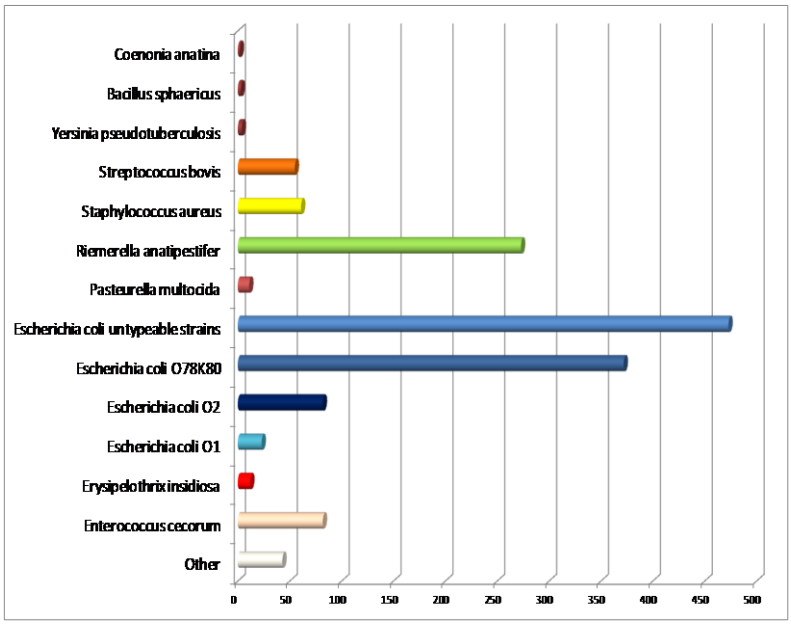
It can be seen that there are two peaks of respiratory diagnostics: the first one at 3 weeks, and the main one at 7-8 weeks, when the growing is at its maximum. The first peak of septicemias is at two weeks as over infection by E. coli taking advantage of impaired host defense due to reovirus or parvovirus infections.

Table 1: the main lesions of respiratory diseases

Aerosacculitis/Pericarditis	72%
Bronchitis or tracheitis with caseum	8%
Coryza	0,1%
Pulmonary Nodules	3%
Pneumonia	15%
Sinusitis	1%
Conjonctivitis	1%

Aerosacculitis is the lesion the most often seen in respiratory diseases in Muscovy duck. Pneumonia is the second one. In ducks sinusitis are not seen frequently (1% only)

Figure 2. Bacteria isolated from Muscovy ducks samples



The most frequently isolated bacteria are E coli, as in other poultry species. Some bacteria are very much associated with some species: Riemerella anatipestifer is more specific of Duck production even if it can affect other birds (turkeys for example). It is incriminated as additional causative agent in the respiratory disease. It can also be a pathogenic bacterium in itself with brutal septicemia or head and neck tremors and torticolis due to meningitis.

Streptococcus bovis is isolated quite only in ducks. It is responsible of Brutal Death Syndrome in Young Ducks [4].

Emergence of disease in free range chicken

As said previously, this is not an epidemiological study sensus stricto. The data shown are based on 3302 pathological cases with necropsy observed on commercial chicken farms in west part of France (10% from free range and 90% from intensive system). Diagnostics are gathered with the same method for the two systems of production.

Table 2. distribution of top ten diagnostics made in free range chicken compared to intensive system.

Distribution of diagnostics	Free Range	Distribution of diagnostics	Intensive System
non specific enteritis	15%	Coccidiosis E acervulina	20%
Omphalitis/yolk infection	12%	non specific enteritis	15%
Necrotic enteritis	11%	Colibacillosis	14%
Coccidiosis E tenella	10%	Omphalitis/yolk infection	14%
Coccidiosis E acervulina	10%	Arthritis	11%
Arthritis	10%	Femoral head necrosis	7%
Colibacillosis	8%	Septicémia	4%
Dehydratation	4%	Steatosis	2%
Roundworms	3%	Dehydratation	2%
Septicemia	3%	Coccidiosis E tenella	1%
Femoral head necrosis	2%	heart fellure	1%

The ten first diagnostics represent 88% of the cases in free range system and 91% in confined system.

Coccidiosis in chicken: Coccidiosis is still an issue in chicken production. In the studied area, in free range production the percentage of vaccinated flocks is around 40% and less than 10% in intensive system. The main difference in coccidiosis is the ratio Acervulina/tennella that varies depending to age much more than with range access or not.

Roundworms: With outdoor range access more parasitism due to roundworm is observed. Preventive treatments given to free range chickens reduce the incidence oh helminthes but it is still in top ten diagnoses.

Table 3. percentage of isolated bacteria from clinical cases in chicken.

	Free Range	Intensive System
E. coli O1	2%	3%
E. coli O2	2%	8%
E. coli O78K80	21%	10%
E. coli untypeable strains	37%	52%
Enterococcus cecorum	4%	10%
Enterococcus faecalis	2%	3%
Enterococcus hirae	1%	1%
Ornithobacterium rhinotracheale	1%	0,1%
Pasteurella multocida	2%	0,2%
Staphylococcus aureus	22%	7%

Generaly speaking, less infectious diseases is observed in free range chicken. Bacteria which are more susceptible to be pathogenic in immunosuppressive conditions are more frequently found in confined system than in free range situation: Untypeable strains of E coli (52% versus37%), enterococcus cecorum (EC) (10% versus 4%). In 2002, Enterococcus cecorum-associated disease outbreaks in broiler flocks were reported for the first time [5], and since then the appearance of EC in broilers has increased. An infection via the respiratory system with EC attached to dust particles seems very likely. One of the reasons of the development may be the great deal of effort that was expended in the last recent years to maintain dry litter in order to decrease footpad dermatitis (footpad monitoring programs). The difference of management in free range and confined chickens may explain the difference in isolation of Enterococcus cecorum.[6]

Free range poultry are more susceptible to be infected by Pasteurella multocida (PM) due to contact with avifauna, rodents, foxes... In free range ducks PM represents 11.3% of the isolated bacteria on pathological cases compared to 0.6 % in confined ones.

Proportionally, Staphylococcus aureus is more often isolated in free range chickens than in confined ones, mainly leading to arthritis.

Influence of free range on food safety pathogens such as Salmonella

There is a common misconception that free range farms are by nature poor biosecurity enterprises. In fact, most biosecurity principles can be effectively implemented to both closed sheds as well as open free-range systems. In France, each flock of chicken has to be checked for presence of Salmonella.

Table 4. comparison of percentage of positive sample in salmonella control (all serotypes) depending on the type of poultry farming

	Presence of Salmonella
Confined intensive chicken (36 days)	4%
Confined certified chicken (56 days)	3%
Free range with good biosecurity (>81 days)	2%
Free range with poor biosecurity (>81 days)	13%

In France, there are several open free range systems. The main one is "label rouge" approved poultry farms with good biosecurity: the production is all in all out; ranges are maintained in a clean condition with grass kept short. No feed is provided on the range. No visitor is allowed to access to the range area and secure fencing prevent access to animals. In these conditions the prevalence of Salmonella is low, only 2% of the flocks are positive (all serotypes).

Emergence of disease in free range laying hens

In France, the emergence of disease and the technical results in free range egg production may vary a lot from results as good as in cages to 20 % of mortality. The necropsies indicate that laying hens housed in litter-based housing systems, with or without access to outdoor areas, are at higher risk of infectious diseases and cannibalistic behaviour compared to laying hens in cages The main issue in alternative laying hens is pecking. A specific lecture is provided to this point in this symposium. Other studies give the same conclusion: **Oddvar Fossum** [7] showed a significantly higher occurrence of bacterial and parasitic diseases and cannibalism in laying hens kept in litter-based housing systems and free-range systems than in hens kept in cages. The occurrence of viral diseases was significantly higher in indoor litter-based housing systems than in cages.

In free range laying hens, access to range increases the prevalence of ascaridia from 5% in cages to 64 % free range.

Influence on viral disease: Free-range birds have access to an outdoor range and are potentially exposed to additional biosecurity risks and diseases, the most significant being wild birds, rodents, wild animals and airborne transmission of infectious agents. But effective and implemented biosecurity plan for free-range flocks will significantly reduce the risk of an exotic disease outbreak. In fact, most biosecurity principles can be effectively implemented to both closed shed as well as open free-range systems.[8].

The difference between alternative production and intensive system is not only a matter of housing (cage/litter access/outdoor range). Density, duration of life, condition of ventilation, management may influence differences in emergence of pathology in alternative production.

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