

ABSTRACT

The appearance of more small and medium-sized farms, well equipped with advanced hall equipment to maintain the normal parameters of microclimate factors and disposal of dejections, corroborated with the interests of property owners to use high performance hybrids, thus required the application of new technologies of rising, of programs of infectious pressure control and full optimization methods of the expenses of any kind, in bird breeding.

After years and years of intensive rising of poultry, there are assessed continuous improvements in productivity field, outstanding achievements in comparison with other branches of the meat processing industry.

The introduction, development and evolution of management systems, spectacular advances in genetics and rapid development of nutritional sciences are the main "engines" that were the basis of those performances.

However, there are still a number of factors that need to be adjusted to the new biological requirements of the birds. Often, ventilation systems are not adequate for the needs of the birds, particular for the physiological needs of the respiratory tract.

The high need of oxygen of broiler chicken (bird who grows extremely fast), can't be satisfied by the reduced lung capacity. This physiological limitation makes that respiratory diseases to be among the most commonly conditions found today in poultry farms.

In late 1970, Buys et al., in South Africa, observed in poultry of 3-4 weeks aged a new disease of respiratory system. Affected birds had nasal and ocular discharge and a slight inflammation of the infraorbital sinuses. This entity was differentiated from other respiratory manifestations by high morbidity and mortality.

In 1980, Du Preez and Buys, succeeded for the first time to isolate the causal virus from nasal exudate of affected birds, managed by multiplying of the virus to reproduce disease symptoms.

In June 1985, the disease was observed in Norfolk (United Kingdom) and from here it spread rapidly to other countries. In France the first case of disease was discovered in 1985.

In these countries it was possible to isolate, characterize and identify the etiologic agent with viral origin ((Buys et al., 1989). Subsequently, the infection was reported in Spain (Anon, 1985), Israel (Weisman et al., 1988), Germany (Hafez et al., 1989), Hungary (Lantos, 1990), S.U.A (Halvorson, 1997, 2004). Currently, the disease is described in several countries in Central Europe, Latin America, Southeast Asia, Middle East and Africa. The disease is found mostly in areas with high density of raising broilers.

The entity was called *turkey rhinotracheitis* (TRT), *turkey coryza* (RC), or avian rhinotracheitis (ART), (Alexander D.J., 1993). In present, the entity is called “*avian pneumovirus infection*” or *avian pneumovirosis*, settling that causative agent is a virus, member of *Paramyxoviridae* family, *Pneumovirus* genus.

In the same period in which rhinotracheitis has been reported in the UK by O'Brien (1985), it was found illness in chickens expressed by minor respiratory issues and intense swollen of head, hence the name of „*Swollen head syndrome of chicken*”- *SHS*. SHS was described for the first time in broilers of 4-6 weeks age in South Africa, after it was reported in many other countries.

Morley and Thomson (cited by Al-Ankari et al., 2001) considered that is the result of mixed infection between *Coronavirus* and *Escherichia coli*. In various european countries, swollen head syndrome (SHS) was detected in both youth and laying hens, and in broilers. Although many causative agents have been incriminated, none of them has managed to faithfully reproduce the disease in experimental conditions.

Epidemiological studies, corroborated with virological tests, established with certainty that avian pneumoviruses must be considered the primary etiologic agents of that two syndromes:

- ✓ *Infectious rhinotracheitis of poultry* and/or
- ✓ *Swollen head syndrome*.

Pneumoviruses have a selective tropism for cells of the upper respiratory tract from the nasal cone, which produces glandular hyperplasia and epithelial damage to the sinuses, conjunctiva and trachea, where the virus is multiplying. These viruses are very rare in the lungs and air sacs.

Considering, on the one hand, the existence in breeding birds of manifestations that can be assigned to pneumovirus infections, and on the other hand the lack of information about their existence in different effectives, there were undertaken researches who followed the presence and prevalence of pneumoviruses in poultry farms, on different age groups.

The paper work includes 125 pages, is written in IX chapters and is structured according to the scientific criteria in two parts. First part (chapter I and II) comprises 25 pages, representing 20% and summarizes the main bibliographic information from literature regarding infections with avian pneumoviruses and represents “The knowledge`s level”.

Second part is extended on 100 pages, which represent 80%, comprise chapter III, IV, V, VI, VII, VIII and it refers to the results of epidemiological investigations, serological and clinical undertaken and constitute “Own research”.

Each chapter from second part has included material and working methods, results, with their discussions and partial conclusions.

In chapter IX are summarized in the 25 formulations the main issues drawn from research and also the recommendations drawn from the results.

The paper work comprise a number of 59 figures, 17 tables and is based on 140 bibliographic titles.

The first part of the paper work is a synthesis of the literature about infections avian pneumoviruses, with aspects about diffusibility in poultry flocks, and also the current knowledge level in the world.

In **chapter I**, entitled “*Bibliographic data about history, etiology, epidemiology and pathogenesis of pneumovirus infections in poultry*” are presented currently knowledge available on pneumoviruses. It reviewed the history of knowledge about infections with avian pneumoviruses, economic importance and taxonomy, morphology, virus structure, virus types characteristics (TRT) and pathogenetic mechanism.

Chapter II, entitled “*Bibliographic data on symptoms, pathology, diagnosis, prevention and control in pneumovirus infections in poultry*” treats aspects of symptoms and lesions caused by pneumovirus in different age groups, both turkeys and in chickens.

It is also presented the methodology of virological and serological diagnosis, surveillance and control measures.

In **chapter III** is presented “*Purpose and objectives*”.

The avian pneumoviruses (metapneumoviruses) with other respiratory viruses have a tropism for local cells of respiratory epithelium of nasal mucosa, sinuses and less for tracheal epithelium.

Initially viruses have a ciliostatic effect, that causes the onset of disease, sneezing occurs in uncomplicated forms, with the presence of unilateral or bilateral runny nose, dyspnoea, sinusitis and conjunctivitis. Later, as a result of complications is recording swelling of the face and head, hence the name of the disease “*swollen head syndrome*.”

Since infections with avian pneumovirus is met in all categories, but its manifests differently depending on the species (chicken or turkey), on age and on the action of stimulating factors, the research was conducted on broiler chicken, on hens for egg consumption and on turkey aiming to detect serological-positive birds (sero-prevalence of infection) and to obtain necessary data for developing strategies of management and control. For this purpose researches pursued followed objectives:

1. Epidemiological, clinical and lesion research in pneumovirus infections in broiler chickens for meat.
2. Epidemiological, clinical and lesion research in pneumovirus infections in hens for egg consumption.
3. Epidemiological, clinical and lesional research in pneumovirus infections in turkey.
4. Research on post-vaccination immune response in immunoprophylaxis of pneumovirus in heavy breeding chickens .
5. Serological research on persistence of maternal antibodies in broiler chickens for meat.

In **chapter IV** entitled „*Epidemiological, clinical, lesional and serological research in pneumovirus infections in broiler chicken for meat*” are given the epidemiological, clinical, lesional and serological investigations in an episode of pneumovirus in broiler chickens for meat. From epidemiological investigations result that since August 2008, have been reported in chicken, in age of 22 to 23 days, occurrence of respiratory syndromes expressed by lacrimation, rhinorrhea, rales and lesional regarding: infraorbital sinusitis predominantly unilateral, swollen of the face and of submandibular region, swollen of head.

Mortality losses have increased dramatically from week 4 of life until the delivery date with 4-5 times, towards technological limits allowed, because of complications with different bacterial pathogens: *Escherichia coli*, *Pseudomonas spp.*, *Staphylococcus spp.*, *Streptococcus spp.* and thus to BRC syndrome. Thus, the analysis of results shows that, although the mortality rate in the first two weeks of life was normal, ranging between 0.41 and 0.88%, it increased significantly from the 3rd (0.59%) week and continued to grow until the slaughtering of flocks, reaching a peak in the 5th week of 3.18% compared to technological limits allowed.

Clinical examination, conducted on broilers chicken in aged of 3-4 weeks, revealed a rate of 0.5-1% infraorbital sinusitis, conjunctivitis uni- and / or bilateral, swollen of face and submandibular zone, swollen of head, significant for "swollen head syndrome."

At necropsy examination it revealed catarrhal inflammation of conjunctival, nasal, and tracheal mucosa and of infraorbital sinuses, presence of sero-gelatinous exudate or mucous in

trachea lumen, strong infiltration with a serous fluid of the connective tissue in the head region. In case of the secondary bacterial infections was observed pericarditis, perihepatitis, pneumonia, inflammation of air sacs and organic dystrophies.

Analysis of serological results obtained show that out of 40 blood serum examined, collected from chicken in age of 39 and 40 days, a number of 17 (42,50) sera showed titers ranging from 1750 to 2750, 15 (37,5%) sera showed titers ranging from 2750 to 8000 and 6 (20%) sera presented titers higher than 8000.

In **chapter V** are revealed the results of epidemiological, clinical and lesional research in pneumovirus infections in hens for egg consumption. Out of 14 580 laying hens ranging from 31 to 34 weeks died between January 10th to 27th a number of 27, which represents 0.19%.

Clinical, it was observed a slight respiratory syndrome, characterized by runny nose, conjunctivitis, facial congestion with slight swelling of the face and the emergence of a syndrome of depression which decreased the percentage of lay and body weight. Thus, out of 225 364 obtained eggs a total of 223,862 (99.23%) were good, 1160 (0.52%) were broken, 519 (0.21%) were soft and 83 (0.04%) eggs were small. Body weight of birds, during the evolution of the depression syndrome of laying and after, decreased by 0.4% from an average of 1921 g / bird to 1904 g / bird.

Serological examination by ELISA assay showed increased antibody titers, ranging from 499 to 6857 at the age of 32 weeks and ranging from 2194 to 9877 at the age of 34 weeks.

At necropsy examination it revealed catarrhal inflammation of the upper respiratory mucosa, presence of a clear secretion, watery or mucous in the trachea, congestion and dystrophic appearance of the organs, and at the level of ovary the presence of deformed ovarian follicles, broken, thickened oviducts and with presence of yolk deposits in abdomen.

In **chapter VI**, entitled “*Epidemiological, clinical and lesional research in pneumovirus infections (pneumovirosis) in youth turkey*”, showed a mortality rate that has increased significantly since the 5th (2.72%) week, reaching a peak of 3,79% in the 8th week. On the 4 halls, the losses varied in quite large limits, from 2190 (17.85%) deaths in hall 1, to 3961 (34.47%) deaths poultry in hall 4.

Clinical, disease was manifested by depressed mood, with closed eyes, contracted neck, nasal discharge initially clear then mucopurulent, sneezing, swelling of infraorbital sinuses, conjunctivitis and submandibular edema.

At necropsy examination it revealed lesions of purulent or serous rhinitis, tracheitis, purulent sinusitis, and serohemorrhagic infiltrations in connective tissue from head and neck regions.

„Serological research on post-vaccination immune response post-vaccination” (**chap. VII**) against pneumovirus in heavy chickens breeding for egg consumption, showed at the first examination a minimum titer of 189 and a maximum titer of 6079, and at the second examination a minimum titer of 1653 and a maximum titer of 11265. Specific antibody titer values vary by time elapsed from inoculation of booster shot. Thus, at first examination, done after 3 weeks, out of 150 sera, 135 (90%) had the value titer ranging from 90 to 1000 and only 15 (10%) had the titer ranging from 1750 to 6500. Instead, at the second examination, performed at age of 32 weeks, on maximum period of laying, out of 180 sera, 25 (13,88%) had titers ranging from 1250 to 2750, 105 (58,34%) had the value of titers ranging from 2750 to 8000, and 50 (27,78) sera with titer values over 8000. The increasing value of the minimum titer from 189 to 1653 and increasing of value of maximum titer from 6079 to 11265, and also as increased antibody values at the second examination in maximum period of laying shows a good post-vaccination immune response and high level of specific antibodies, meat broiler chicken flocks from immunized parents normally developed in terms of health, there were no respiratory syndromes during growing- finishing period, and mortality losses were reduced in the limits of normal technologies.

The serological research concerning persistence of maternal antibodies in broilers coming from breeding parents preventive immunized at the age of 10 weeks with booster at 18 weeks (**chapter VIII**), showed at the age of one day a minimum titer with value of 368, and the maximum titer value of 8629, while at the age of 14 days, a minimum titer value of 16 and a maximum titer value of 5366. Instead, the minimal titer value of maternal antibodies in broiler chickens in age of one day coming from parents past by natural infection in growth phase was 47, and the maximum was 11258. At the age of 14 days minimum titer value recorded was 16 and the maximum was 5366. The obtained results lead us to appreciate that both chicken in age of one day coming from prevented immunized parents and those from parents passed through natural infection, have values of maternal antibodies which can provide an antiviral protection. Instead, at age of 14 days, both chicken coming from immunized parents and those from parents passed through natural infection, maternal antibody titer minimum value has decreased about 3 times and the maximum titre decreased about 2 times, which shows a lack of antiviral protection. It is estimated that maternal antibodies persist about 10-14 days.

In **chapter IX** are presented the final conclusion in 25 formulations. Based on data from outcomes researches, in terms of the potential presence of pneumovirus infections in different bird flocks, there have been formulated a number of 15 recommendations.