

Treating respiratory tract infections in poultry with the use of herbs

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The permanently occurring problems at farms with improper ventilation, increased humidity, excessive dust, poor quality bedding, too high density of birds, high concentration of harmful gases and bacterial, fungal or viral infections lead to disorders in functioning of the respiratory tract of birds.

The respiratory system of birds is unique in terms of its structure as well as functions. It consists of the following elements in the order provided: nasal cavity, larynx, trachea, syrinx which is formed by the last tracheal cartilages and the first sections of the bronchi, constituting a voice production organ.

The next element are the lungs; in the lung parenchyma the main branch of the bronchus is located, which is further divided into secondary bronchi: dorsobronchi and ventrobronchi. Those in turn are connected by the parabronchi which are the relevant respiratory element of the lung parenchyma.

The next extremely important and unique element of the respiratory tract are the air sacs. They are thin-walled, membranous protrusions of the relevant bronchi. Their functions are varied, but the most important of them include: participation in efficient gas exchange, bone pneumatization and thermoregulation.

The last of the above mentioned functions is crucial in the periods of extremely high temperatures as the birds do not have any sweat glands, and therefore they expel excessive heat mainly through the respiratory system. In a reverse situation, during low temperatures, the air sacs constitute an isolating air layer for important internal organs. They additionally decrease specific gravity of a bird's organism (adaptation for flight and diving), facilitate excretion, enhance voice strength and help in egg laying.

On the other hand, the above described anatomic structure of the respiratory system of birds predisposes those animals to a series of health disorders.

High humidity, optimum temperature and high oxygen content in the area of the

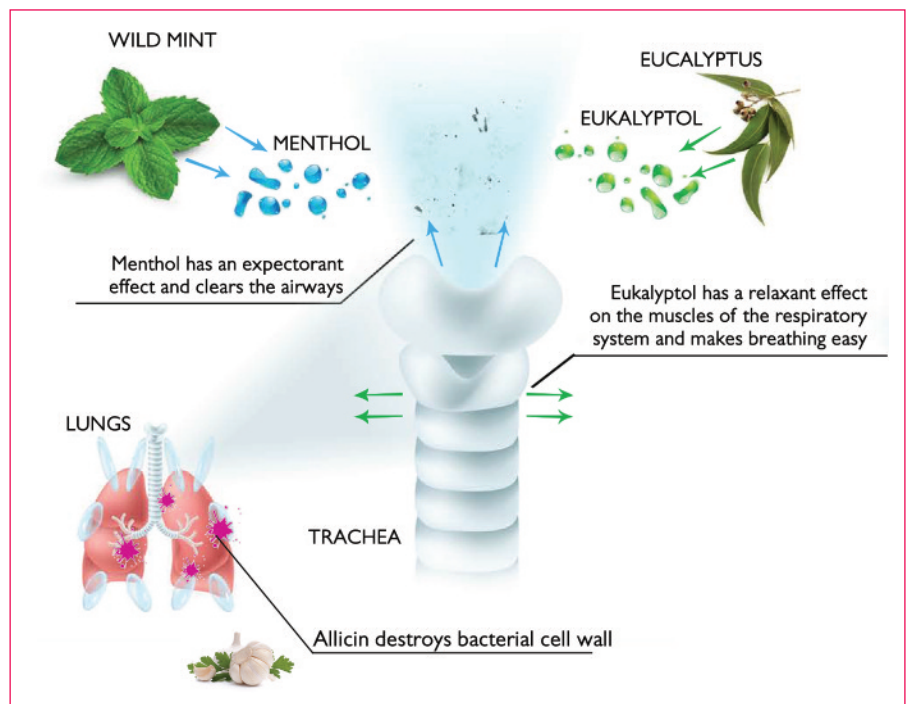


Fig. 1. Mode of action of herbal substances in the respiratory tract.

respiratory tract constitute perfect conditions for the development of pathogens.

The above mentioned problems may contribute to a series of various health disorders at farms, depending on intensity and period of occurrence.

Most of them may cause the decrease of the growth rate of birds, increase of the feed consumption ratio and increase mortality rate in the flock. Which of them are the most dangerous for the respiratory system of birds and what consequences do they entail?

Overheating

Due to the increase of temperature of the environment of birds heat exchange by evaporation takes place, which as a consequence may lead to the development of heat stress. In such cases the following may be observed: decreased appetite, panting, decreased activity, increased water consumption, wing flapping or pathological

eating of bedding. High temperature causes excessive water evaporation from the mucous membranes of the respiratory tract which results in their drying and cracking, thus opening the way for pathogenic bacteria penetration.

Underheating

Most often underheating is caused by construction errors in facilities or improper technology of bird rearing. Hypothermia is most dangerous for young birds which do not have the thermoregulatory system properly developed yet. Decreasing temperature is usually accompanied by humidity increase, both of which, when combined, result in worsening quality of bedding.

In such conditions general immunity is degenerated, which exposes birds to accompanying infections – most often bacterial (*E. coli*, mycoplasma, *Ornithobacterium rhinotracheale*,

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Bordetella avium, *Pasteurella multocida*, *Gallibacterium anatis*) and fungal (*Aspergillus* sp.), which show affinity to the respiratory system. In such cases the following may be observed: seromucous nasal discharge, swelling of the infraorbital sinuses, sneezing, shaking heads, wheezing or dyspnea.

Bedding

The quality of bedding is an extremely important parameter during the whole period of utilising birds. Poor quality bedding may pose a threat not only to the health of birds, but also to the health of the staff.

Large amounts of bacteria and fungi (including also from the mould and yeast-like group) may multiply in the bedding. Improper quality of bedding material is also the place where mycotoxins accumulate. In such cases the following respiratory symptoms may be found in the flock: wheezing, dyspnea, squatting with stretched neck and open beak (*Aspergillus* sp.), characteristic 'yawning' (*Candida* sp.).

The presence of fungal nodules on the air sacs and in the lung area as well as congestion of the upper respiratory tract are most often diagnosed on post-mortem examination. Mycotoxin poisoning is mainly characterised by non-specific symptoms outside the respiratory system.

Excessive dust

Excessive dust is the result of co-existence of most of the above mentioned factors. This problem appears mainly during the summer, when due to persistent heat the hall must be ventilated intensively. This phenomenon is also caused by excessive density of animals and dusty feed.

The most dangerous are the smallest particles of airborne dust in the environment of birds. They reach the last sections of the respiratory tract causing dyspnea, snorting, wheezing and sometimes production of seromucous nasal discharge from the upper respiratory tract.

Presence of harmful gases

Biological processes occurring in the environment of birds (decomposition of droppings in bedding) result in emission of excessive amounts of ammonia, sulphide and carbon dioxide as well as methane to a lesser extent. Those gases irritate the mucous membranes and have a destructive effect on the structure of the ciliary epithelium lining the surface of the respiratory tract. Disease symptoms are similar to those present in the case of excessive dust. Inflammation in the whole respiratory tract and damage to the ciliary epithelium or its exfoliation are diagnosed on post-mortem examination.

The factors presented above concern most farms in various climatic zones and comprise only a small percentage of factors causing disorders in functioning of the respiratory tract of birds. Most of those disorders are usually underestimated, which in consequence leads to the necessity of administering antibiotics or chemiotherapeutic agents.

Treatment therapies involving the respiratory system of birds are usually complex, long lasting and extremely costly. Moreover, the strains of bacteria immune to antibiotics which appear in the environment, shorter and shorter animal production period and further legal restrictions are a strong stimulus for seeking alternative methods of prophylaxis of basic health disorders. One of the alternatives may be natural active substances contained in herbs.

A few of those herbs which are effective in prophylaxis of the respiratory tract along with their effects include mint oil and eucalyptus oil.

Mint oil (menthol)

Obtained mainly from fresh mint leaves, menthol, in contact with mucous membranes of the respiratory tract, acts as an expectorant, facilitating purification of the respiratory tract from small dusty pollutants. It also has a relaxing, antibacterial, secretory and cooling effect. In the periods of high

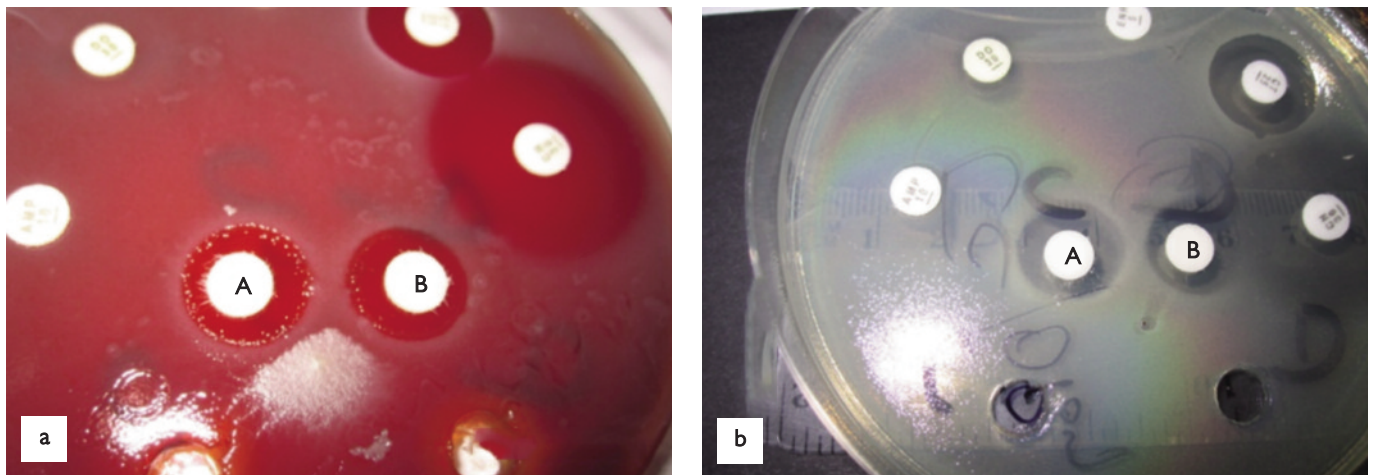


Fig. 2. The zones of inhibition of Alisan against very resistant *E. coli* strains were a) blood agar plate: 12mm, b) standard agar plate: 14mm.

temperature an addition of an agent with a cooling effect on an organism is a very beneficial solution. Menthol has one more useful characteristic. It has a disinfection effect on the bronchi, preventing infections in the respiratory tract of birds.

Eucalyptus oil

Eucalyptus oil is obtained from the leaves of *Eucalyptus globulus*, characterised mainly by the presence of cineol and eucalyptol acting as active substances. The active substances of eucalyptus oil act as an expectorant and have a relaxing effect on the muscles of the respiratory system. The raw material irritates the nasal mucous membranes facilitating the removal of discharge together with harmful dusts, thus restoring patency of the respiratory tract and at the same time facilitating breathing and ventilation of an organism. Patency of the respiratory system and its proper cross section provide a guarantee of appropriate ventilation of the air sacs.

Vitamin A

Vitamin A is responsible for proper functioning of the immune system of a bird's organism. It protects an organism against infections, facilitates the functioning of barriers which disable penetration of germs into the organism, stimulates the immune system in order to fight pathogens. It prevents the epithelium and mucous membranes of the respiratory tract from drying and growing callused, and at the same time it has a regenerative effect on cells and thus protects the damaged or irritated areas.

These three substances are the ingredients of the Mintamix product from BioPoint, Poland. It is an effective preparation on poultry farms in countries such as Egypt, Pakistan or Iraq, where the problems with disorders of functioning of the respiratory

tract are very often. Another example of a herbal substance which helps in managing the health of respiratory system in poultry is garlic.

Garlic

The factor determining the ant-microbial properties of garlic is allicin. Allicin has the ability to easily infiltrate the cell membranes of micro-organisms. Allicin combines with the cell enzymes inside the cell as a result of which the cell enzymes are blocked.

As a consequence, the inhibition of the functioning of the enzymatic apparatus causes disruption of functioning of the cell membrane and the basic metabolic pathways, leading to death of the bacterial cell. Biopoint's product Alisan is characterised by high content of garlic extract. A test was conducted in in vitro conditions aimed at assessment of the effect of antibacterial activity of Alisan preparation.

Test method and results

The material for tests were the strains of *E. coli* exhibiting immunity to most commonly applied antibiotics (doxycycline, enrofloxacin, florfenicol). The strains came from a flock of broiler chickens in which clinical symptoms were observed, most often dyspnea, wheezing, sneezing and increased mortality rate.

On post-mortem examination the following were found among others: aerosacculitis, peritonitis, perihepatitis and pericarditis. The strands of bacteria were isolated from the above mentioned areas which were pathologically changed.

The culture was grown on standard agar plates and on sheep blood agar plates (Fig. 2) onto which bacterial suspension was placed (<1 according to McFarland scale).

Antibiotic sensitivity of *E. coli* was determined using disc diffusion method by applying antibiotic discs and discs diffused with Alisan preparation in two different

concentrations (A-50%, B-25%). The areas of inhibition were standard agar plate 14mm and blood agar plate 12mm.

The results may prove antibacterial effect of Alisan preparation in the case of highly resistant strains of *E. coli* isolated from the respiratory system of birds. Such effect may suggest the possibility of using herbal preparations as an alternative to antibiotics and may confirm supporting the standard methods of treatment with preparations containing natural herbal extracts.

Electrolytes

Effective support of functioning of the respiratory system must also be accompanied by proper supplementation with electrolytes – sodium, potassium and magnesium in the form of salts, so that the birds are efficiently protected against loss of water in the periods of intensified heat or disease of the respiratory system. Loss of water means general weakening of an organism and decrease of immunity, which as a consequence creates favourable conditions for the development of diseases of the respiratory system.

Proper supplementation with electrolytes is provided by Biopoint products such as Osmozan liquid or Biostress C, which contain the basic macroelements in the form of various inorganic salts (chlorides, sulphates).

Proper gas exchange taking place in the respiratory system is a crucial factor providing health and good condition of animals. All of the critical situations mentioned and described above directly affect the final production outcome.

By allowing any of those disorders to occur we condemn our production to failure resulting from the increased mortality rate, increased feed consumption rate and substantial financial expenditure for treatment. In order to protect the flock, and at the same time your budget, you have to understand the problem and prevent its development. ■