

MucuSol & UNI-SOL® TAG-TEAM FOR RESPIRATORY RELIEF

We continue to experience extended respiratory disease seasons, with poultry snicking and raling alerting you to more threatening production losses. With cool nights, temperature swings and reduced ventilation conspiring against you, setting the stage for respiratory troubles. Breathe easier though, there's a pair of non-antibiotic interventions brining poultry respiratory relief. Respiratory distress is a combination of airway inflammation and congestion caused by a multitude of infectious agents and irritants shown in the nearby table. Regardless of the infectious agent, the root causes of respiratory problems are airway inflammation and congestion. When you control inflammation and congestion, you've controlled the problem. In this case you've got two powerful problem stoppers... the top performing anti-inflammatory Uni-Sol, and MucuSol, the market's newest and strongest expectorant. When flu or other respiratory problems threaten to plug-up your production, Uni-Sol and MucuSol clear it out with both barrels.

Tackle Prostaglandins and Inflammation

Injured airway tissues respond by releasing prostaglandins, responsible for the problems you see like fever, fluid accumulation, swelling and congestion. Prostaglandins also create problems you don't immediately see. Prostaglandins suppress immunity; they depress white blood cell and antibody production. In addition to its traditional use as a potent anti-inflammatory, Uni-Sol at higher doses blocks harmful prostaglandins. This means Uni-Sol not only relieves redness, fever, edema and swelling, it also supports healing by opening the gate to allow more natural defensive white cells into the fight. The types of white cells that respond best to Uni-Sol are lymphocytes, the specialized ones that create memory, recognize pathogens and rally protective antibodies.



Lymphocytes like this one create the body's memory to attack invading pathogens



USDA-ARS researchers in Fayetteville, Arkansas successfully used Uni-Sol to increase resistance to respiratory disease. Scientists injected disease-causing E. coli bacteria into 5-week-old turkey poults' air sacs to infect the bird's airways. In their research, this respiratory infection reliably produces air sac lesions, spreads to injure and swell up other organs and results in high mortality. Half the poults in this research received a protective dose of Uni-Sol liquid concentrate (1.75 ounces per 1,000 lb bodyweight daily) diluted in their drinking water throughout trial. The other half served as unprotected controls. As is typical, mortality was elevated, reaching 13% in infected control poults, while none of the birds receiving Uni-Sol died (Fig. 1). Significantly higher air sac scores in control turkeys confirmed the respiratory disease's effects (Fig. 2). After two weeks the researchers found live E. coli had spread to 17.4% of the control turkeys' livers, compared to none being isolated from the livers of birds drinking Uni-Sol (Fig. 3). Importantly, Uni-Sol also reduced the body weight loss that affected the challenged controls.

The severely infected control birds suffered from enlarged organs, with bursa, spleen, liver and heart swelling 54-64% heavier than their normal, non-challenged controls. Uni-Sol significantly reduced swelling among the same organs in challenged turkeys, limiting them to a 5-18% increase over non-infected birds (Fig. 4).

Uni-Sol also boosted white blood cell status in challenged turkeys. Compared to non-infected birds, total white blood cells (leukocytes) in infected poults increased 10%, while counterparts receiving Uni-Sol increased white blood cells by 20%. A much more dramatic improvement occurred among the memory- and antibody-building lymphocytes. Uni-Sol increased these cells to a concentration 69% higher than non-challenged controls, a response that was over 2.5x higher than infected turkeys without Uni-Sol (Fig. 5).USDA-ARS researchers in Fayetteville, Arkansas successfully used Uni-Sol to increase resistance to respiratory disease. Scientists injected disease-causing E. coli bacteria into 5-week-old turkey poults' air sacs to infect the bird's airways. In their research, this respiratory infection reliably produces air sac lesions, spreads to injure and swell up other organs and results in high mortality. Half the poults in this research received a protective dose of Uni-Sol liquid concentrate (1.75 ounces per 1,000 lb bodyweight daily) diluted in their drinking water throughout trial. The other half served as unprotected controls.

As is typical, mortality was elevated, reaching 13% in infected control poults, while none of the birds receiving Uni-Sol died (Fig. 1). Significantly higher air sac scores in control turkeys confirmed the respiratory disease's effects (Fig. 2). After two weeks the researchers found live E. coli had spread to 17.4% of the control turkeys' livers, compared to none being isolated from the livers of birds drinking Uni-Sol (Fig. 3). Importantly, Uni-Sol also reduced the body weight loss that affected the challenged controls.







The severely infected control birds suffered from enlarged organs, with bursa, spleen, liver and heart swelling 54-64% heavier than their normal, non-challenged controls. Uni-Sol significantly reduced swelling among the same organs in challenged turkeys, limiting them to a 5-18% increase over non-infected birds (Fig. 4).

Uni-Sol also boosted white blood cell status in challenged turkeys. Compared to non-infected birds, total white blood cells (leukocytes) in infected poults increased 10%, while counterparts receiving Uni-Sol increased white blood cells by 20%. A much more dramatic improvement occurred among the memory- and antibody-building lymphocytes. Uni-Sol increased these cells to a concentration 69% higher than non-challenged controls, a response that was over 2.5x higher than infected turkeys without Uni-Sol (Fig. 5). The researchers concluded that using Uni-Sol "during an infectious challenge can guard against the debilitating effects of stress and infection." Uni-Sol overwhelmingly protected the birds from the primary infection in their airways and organs, but Uni-Sol also needs a partner to help clear out the mucus congestion responsible for the secondary effect of poor breathing efficiency.

Blown Away by MucuSol

Irritating coughs come with airway infection, or dust and gas in houses with poor quality air. If the cough is a dry one, it is not productive, meaning it irritates the respiratory tract further instead of dislodging phlegm and expelling the irritant. The foreign material might be irritating particles, or it could be infectious pathogens like viruses and bacteria. Though mucus cannot stop the invasion of pathogens, it is important for it to trap them and then help clear the airway of the mucus and particles. The cilia along the airways help to sweep the phlegm along. These specialized cells elevate the mucus and its trapped particles move out of the airways. The accumulated mucus also stimulates the cough or sneeze response that expels the fluid material to prevent it from plugging the airway. Airway bacteria and viruses cause excessive mucus production and secretion as well as decreased ciliary movement and clearance of particles. Therapeutic intervention in the pathophysiology of airway mucus hypersecretion is clinically important (Seagrave et al, 2012).

The historical use of botanical expectorants was noted among tropical Americans using Guaiac tree extracts in the 16th century. More recently gum of the Guaiacum spp., which is approved in Europe and the U.S. as a food additive, was refined and eventually synthesized as quaifenesin. Recently, researchers developed a way to directly and objectively measure the benefits of the successful expectorant guaifenesin. Seagrave et al. (2012) demonstrated some functions of guaifenesin in vitro.

Up, Up and Away

There's a problem with studying respiratory tracts: It's difficult to learn how the tract linings are reacting to treatment without destructively opening up the animal or invading the airway. Researchers (Seagrave et al. 2012) overcame this predicament by growing respiratory cells in culture plates so their cilia and mucus production could be watched and measured more easily. The researchers intentionally disturbed the living cells with an irritant challenge, and they watched as the cells reacted to the injury by producing mucin and using their cilia to sweep it away. This test system allowed the cells to be studied with different concentrations of guaifenesin treatment over a long duration.



Video images of the cells showed visible particles and structures embedded in

the mucus (Figure 1). As ciliary cells swept the mucus, those particles could be tracked and the mucus transport speed measured. Guaifenesin increased the speed of the mucus transport. By 8 hours after treatment with guaifenesin, the transport speed was 40 and 60% faster with guaifenesin doses of 30 and 100 uM, respectively.



Twenty-four hours after treatment the 30 uM concentration of guaifenesin was increasing transport speed a blazing 6-times (Figure 2).

Get Unplugged

The untreated control cells in this test doubled their mucus secretions after being challenged. Treating the irritated cells with increasing doses of guaifenesin reduced the secretion, and the positive impact was directly related to the concentration of the guaifenesin dose used (Figure 3).

When mucus is thicker and stretches more, it holds firmly to the airway, making it harder to dislodge and clear. Twenty-four hours after beginning guaifenesin treatment, the mucus produced by the cells was less than 10% as viscous and elastic, relative to non-challenged controls. Thinner and less-stretchy mucus is easier for animals to expel, carrying along with it the encapsulated invading organisms or debris (Figure 4).

MucuSol-Breathe Easy

The expectorant guaifenesin had the power to reduce mucus production in a dose-wise manner. This property underscores MucuSol's positive impact. It gives veterinarians a degree of control over the impact they seek, both in terms of mucus production and the cough's productivity. Guaifenesin's decreases in mucus secretion were accompanied by incremental decreases in mucus viscosity and elasticity. Animals with thinner and less stretchy or sticky mucus can clear it out more easily, reducing respiratory congestion. Visually tracking embedded particles to measure ciliary transport speed is an imaginatively direct way to confirm that the mucus is escorting the offensive invaders away more efficiently.

MucuSol is an ideal solution because, being a liquid syrup, it avoids the insolubility that has plagued old-style powdered expectorants and led to their notoriously weak impact. This research spotlights more of the science behind MucuSol's success. Three mechanisms clear airways and make coughs more productive: a) reducing excess mucus production, b) making mucus thinner and less elastic, and c) increasing the speed that it is carried out. MucuSol relieves the common respiratory threat of congestion as an important part of unplugging livestock production.

MucuSol contains the richest concentration of water-soluble guaifenesin, the most recognized expectorant for human and animal use. Thinning the mucus and promoting reflex movement increases the cough's efficiency and speeds recovery, eliminating the costly secondary effects of respiratory disease.

A Non-antibiotic Intervention Tag Team

If respiratory disease is a constant fight, then MucuSol and Uni-Sol are your "Respiratory Tag-Team." Uni-Sol holds the animal's prostaglandins down while MucuSol simply makes coughs more productive. All the while with no use of antibiotics you are able to use these non -antibiotic interventions to combat your poultry respiratory disease.

