

Use of Biosecurity and Natural Remedies for the Prevention of Poultry Disease in Natural and Organic Flocks

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There are three parts to an overall **health management plan**:

1. A *biosecurity plan* is key to reducing the risk of health problems on your farm.
2. *Ongoing health monitoring* is important, since early detection is key to reducing the economic impact of any health problem.
3. A *reaction plan* in the case of a health problem should be in place. You need to know what to do prior to the problem occurring so that the time lag between detection and reaction to the problem is kept to a minimum.

Biosecurity Plan

It is easier to prevent disease than it is to treat an outbreak. A biosecurity plan is essential to an effective health management plan. ‘Bio’ refers to life and ‘Security’ is protection. A biosecurity program for a poultry farm is a series of common-sense activities designed to keep disease (bacterial, viral, parasitic) out of the poultry flock. There are four basic sections to a biosecurity program.

RESTRICT ACCESS TO YOUR PROPERTY AND BIRDS

It is good to fence off the area where you keep your birds. Only let people who care for the birds come into contact with them. If you have visitors who would like to see your flock, make sure they have clean shoes and clothes. Even better, provide your visitors with clean boots or have plastic booties available for them to use. If your visitors own birds, they should not be allowed to come near your birds.

In addition to keeping people away from your flock, try to keep all birds, especially game birds

and migratory waterfowl, away as well. These birds can carry disease, including avian influenza. If you keep your birds outside, it is a good idea to keep them in a screened area. This is a good predator control measure as well.

KEEP IT CLEAN

Disease-causing germs can be picked up by your shoes and clothes and transferred from one area to another. It is recommended that you keep a clean pair of shoes and a set of clothes that you wear only when caring for your flock. If you are not able to do this, make sure that you clean and disinfect your shoes and wash your clothes before you work with your birds. Shoes should be scrubbed to remove droppings, mud or debris.

Follow an all-in-all-out system where flocks on the farm are all of the same age. If you have multiple-ages on your farm, care for the youngest birds first.

Always wash your hands thoroughly with soap and water before entering your bird area. For your protection, do not forget to wash after as well.

Keep the poultry house clean. Clean and disinfect any new or used equipment before it comes in contact with your birds or their droppings. That includes equipment such as feed scoops, shovels, rakes, and brooms. Disinfectants don’t work on a dirty surface so make sure that all manure and other debris is removed from the surface first.

Properly dispose of dead birds immediately. Refer to the publication ID-167: “On-farm Disposal of Animal Mortalities” for more information on proper disposal of dead birds.

DON'T BRING DISEASE HOME

Vehicle tires, poultry cages, and equipment used with your flock can all harbor disease-causing organisms. If you travel to a location where there are other birds present, be sure to clean and disinfect these items before you return to your property. This can even include a trip to the feed store.

DON'T BORROW DISEASE

It is strongly recommended that you do not share lawn and garden equipment, tools, or poultry supplies with your neighbors or other bird owners. If you do, when you bring these things home, clean and disinfect them before they reach your property. Just as important, remember to clean and disinfect any items that you borrow before returning them. Never share items that cannot be disinfected. This would include wooden pallets or cardboard egg cartons.

Ongoing Health Monitoring

A specific time should be set aside daily to just stand still and observe your flock. Once the flock has settled down, birds that are only mildly ill may be identified. When things quiet down in the barn, abnormal respiratory sounds, called a “snick,” can be heard. The sounds may have a variety of characteristics such as a high-pitched “squeak,” a sudden “chuck” sound like a cough, or a gurgling or rattling sound.

It is important to keep good records of daily activities and observations, feed and water consumption, production (egg production or growth rate), and mortality. The first signs of a health problem can be detected by drops in feed consumption and/or egg production or a slight, but continuous increase in the number of dead birds found each day. With a drop in feed and/or water consumption, it is good to have a list of mechanical things to check including the proper functioning of the feed, water, heating, and ventilation systems.

Examine your birds daily and look for anything that might indicate that something is wrong. Early disease detection is very important to containing it. Everyone working with your flock should know what symptoms to look for. Signs of

disease can include:

- Sudden death
- Diarrhea
- Decreased egg production
- Increased incidence of soft-shelled or misshapen eggs
- Respiratory signs including sneezing, gasping for air, nasal discharge, coughing
- Reduced feed consumption
- Reduce bird activity
- Swelling of tissues around the eyes or neck
- Purple discoloration of the wattles, combs and/or legs
- Nervous disorders: Muscular tremors, drooping wings, twisting of head and neck, incoordination, complete paralysis

Changes in egg production, feed consumption and mortality can happen over a few days and be hard to identify. It is important to keep good records on daily egg production, feed consumption and mortality. Such records are important for monitoring the productive health of your flock which can have effects on your economic bottom line.

Reaction Plan

As for all poultry, health management in organic and/or natural poultry production is primarily based on disease prevention through implementation of a biosecurity plan. While creating a cost-effective biosecurity plan is very important, it is also critical to have a plan in place to react to any health crisis that may occur. **This reaction plan should be written down and pre-approved by your certifier.**

The first step is diagnosing a problem—you cannot decide what to do if you do not know what the problem is. Once you have eliminated mechanical problems, you should consider the possibility of a disease situation. You may need to see a veterinarian to help diagnose the problem. Is the problem digestive, reproductive, or respiratory in nature?

The second step is correcting the problem whether that requires a management change or treating a disease. Have a trouble-shooting plan in place so that you know what to do if there is a problem with the flock. For a drop in egg produc-

tion, for example, this can include making sure that the flock is drinking and eating regularly, verifying the quality of the feed, operation of the feeders, etc. Make sure that the birds are not overheated. If they are eating normally, the egg production may be the result of a disease situation. Monitor the flock for any signs of disease.

Behavioral Disturbances

Poultry kept in cage-free housing systems, whether on littered floor only or with outdoor grazing, can be affected by a number of behavioral disturbances. The most common problems in organic laying hens are similar to those in conventionally managed poultry – feather pecking and cannibalism. It is known from research with conventional egg production that these problems can be triggered by a number of different factors including feed composition or quality, rearing environment, overcrowding, external parasites, and other management factors.

Genetics also play a role in behavior problems. A producer's choice of breed or strain can have an effect on the level of feather pecking and/or cannibalism in organic flocks. However, due to intense ongoing breeding efforts the available commercial strains are continuously changing, both in terms of production capacity and temperament. It is difficult, therefore, to give any specific advice regarding the choice of breed or strain. It is important, however, to consider the temperament of the breed when choosing your poultry flock. Check with the breeder and/or other producers with more experience.

There has not been a lot of research done on the use of wound treatments for poultry. Most commercial poultry producers think in terms of flock health and not any specific individual bird. For large operations it is often more cost effective to cull injured birds. In smaller flocks, however, care and recovery of such birds may play a role. There are a variety of wound sprays available for pets that can be used but it is important that there are no residues transferred to eggs.

Sometimes it is necessary to 'think outside the box' when trying to find solutions to bird-to-bird aggression in a poultry flock. Providing 'distractions' may help with the problem. This could

include putting straw or hanging shiny objects such as old computer disks or empty soda cans for them to play with and, hopefully, reduce the feather pecking.

External Parasites

Continuous external parasites are those that spend all of their adult life on the host. Common continuous external parasites of poultry are stick-tight fleas, chicken body lice, scaly leg mites, and northern fowl mites. Temporary external parasites are those which feed on the host but don't live on the host. Common temporary external parasites of poultry include fowl ticks (also known as blue bugs), bed bugs, and chicken mites (also known as red mites or roost mites).

While there are a number of products approved for use in Europe, there are only a few approved for use in the United States. Pyrethrum-containing products can be used in poultry houses to control insects. The pyrethrum is a botanical insecticide derived from chrysanthemums. Pyrethroids are synthetic versions of pyrethrum.

Old time remedies are making a re-appearance. Some have been tested in a research setting while others have been tested on-farm by individual producers with only antidotal information available. For example, the topical application of garlic was tested as a method to reduce northern fowl mite infestation. In a research setting, laying hens were individually sprayed around the vent with either water or 10 percent garlic juice in water. They were sprayed continuously each week for three weeks. Topical application of garlic juice was shown to be an effective way to decrease, but not eliminate, northern fowl mite infestation in laying hens.

There have been a variety of success-stories printed in various magazines or spread by word of mouth. Little research supports the use of such treatments. In some cases, the treatments can be dangerous. For example, the use of potassium permanganate has been suggested in the treatment of scaly-leg mites, but potassium permanganate is an oxidizing agent and will react with other chemicals. When mixed with hydrogen peroxide, for example, the reaction is explosive.

Diatomaceous earth (DE) is believed to be a nat-

ural insect control powder. Diatomaceous earth is obtained from deposits of diatomite which are the fossilized sedimentary layers of tiny phytoplankton called diatoms. Diatomaceous earth is a form of amorphous silica that can kill insects by desiccation (drying them out) by absorbing the oily or waxy cuticle layer during direct contact. When the thin, waterproof layer is lost, the insect loses water and dies. In addition to its desiccant action, DE works abrasively to rupture insect cuticles. Diatomaceous earth has been reviewed by the Organic Materials Review Institute (OMRI). A few DE-products are OMRI-Listed as approved for organic poultry production.

Internal Parasites

The most common internal parasite of poultry is **coccidia**, a protozoa found almost everywhere poultry are kept. Today, a reasonably safe and effective vaccine is available for use in organic poultry production but it must be given early (typically to day-old chicks).

Garlic is used with many animals to prevent intestinal worm and parasite infestations. Regular addition of garlic into the drinking water is said to control intestinal worms. Garlic is said to be especially effective when used in conjunction with worm-repelling plants, such as wormwood and mint, strategically placed around the coop. Again, this is based on antidotal information and has not been confirmed in a research setting. In addition, there is no research into the effect on the taste of the eggs from feeding such materials.

There is some research to show that diatomaceous earth can be effective in controlling, but not eliminating internal parasites. There is concern, however, that the diatomaceous earth can be abrasive to the lining of the digestive tract.

Chopped or ground pumpkin seeds are said to be good for the control of tapeworms in laying hens although there is no published research to confirm this. There are commercial intestinal control products that make use of pumpkin seeds as an ingredient. For example, Durvet Strike III has pumpkin seeds and diatomaceous earth. It is not clear which component, if either, is effective in parasite control.

PASTURE MANAGEMENT FOR PARASITE CONTROL

There are only a few de-worming products available for poultry in general and no de-worming products available for use with laying hens. Pasture rotation to break the life cycle of worms is the best management practice to prevent infestation. Antidotal reports indicate that inclusion of specific plants in the pasture has been shown to have some affect. For example, a company in Australia is recommending the use of a number of plants for inclusion in a pasture to help with the control of external and/or internal parasites. For example:

Wormwood is a medium-sized bush that is said to have remarkable pest fighting properties. The chickens will pick at the leaves and will brush against it, helping to get rid of any internal and external parasites.

Peppermint is a creeper plant that also offers a terrific scent around the poultry yard. When planted around the coop area, the chickens will eat and walk on the leaves assisting with internal and external parasite eradication.

Citronella, also known as lemon grass, forms large clumps of aromatic long leaves that are said to keep flies, fleas and mites away from the coop area. The chickens eat the tips and brush against the bushes when planted close by.

Additional plants recommended for use in poultry pastures:

Dandelion is believed to be a stimulant to the immune system. In alternative medicine, dandelions are used to treat kidney and liver disorders of humans. Externally dandelion is used to treat skin disorders.

Yarrow is a medicinal herb used as an antiseptic and digestive aid. In alternative medicine, yarrow is used against colds and skin irritations.

Sage has been held in high regard throughout history for its culinary and medicinal properties. It is believed to have health-promoting properties.

Nasturtium is a ground cover creeper which has beautiful flowers. When planted near the coop area the chickens will eat the juicy leaves and succulent bright orange or yellow flowers helping to rid them of any internal parasites.

Disease Control and Treatment

There is a variety of potentially useful ingredients that can be added to the feed or drinking water of a poultry flock to improve production or to reduce the spread of disease. Some of these potential ingredients have been tested in live poultry flocks while others have only been tested in a laboratory without the use of birds. Many of the potential ingredients need to be more thoroughly tested in live birds and in real production flocks before they will be completely embraced by poultry producers. There are, however, a few products that are OMRI-listed that can be used to prevent or treat some disease situations of organic poultry flocks.

A **probiotic** is a culture of a single bacteria strain, or mixture of different strains, that can be fed to an animal to improve some aspect of its health. Probiotics are also referred to as direct fed microbials (DFM). Probiotics are permitted under the rules specified by the National Organic Program (NOP) but may not be fed in amounts above those needed for adequate nutrition and health maintenance for the species and its specific stage in life. Under NOP rules, probiotics may not be used to stimulate growth or production.

Probiotics are a potential tool for reducing intestinal contamination by disease-causing and foodborne bacteria. They may also be useful in prevention or treatment of coccidiosis.

Prebiotics are nondigestible carbohydrates (compounds containing carbon, hydrogen and oxygen—CHO). Many of these carbohydrates are short chains of mono-saccharides (single sugar molecules such as sucrose, glucose, etc.), or a saccharide that contains a known small number of mono-saccharides, called oligosaccharides. Some oligosaccharides are thought to enhance the growth of beneficial organisms in the gut, and others are thought to function as competitive attachment sites for pathogenic bacteria.

Two of the most commonly studied prebiotic oligosaccharides are fructooligosaccharides (FOS) and mannanoligosaccharides (MOS). FOS can be found naturally in some cereal crops and onions. MOS is obtained from the cell wall of yeast.

Organic acids have been used successfully in pig production for more than 25 years and continue to be the most effective alternative to antibiotics. While much less work has been done with poultry, research indicates that they have a potential role. The antimicrobial activity of organic acids is related to the reduction in pH and its ability to dissociate (break down to its component parts). The undissociated form of the organic acid penetrates the cell membrane of bacteria and disrupts normal cell metabolism. Formic, acetic and propionic acids, which are organic acids, have the potential to reduce *Salmonella* and *Campylobacter* colonization in the gut of poultry.

Acetic acid is the main component of vinegar. Apple cider vinegar is rich in the vitamins, minerals and trace elements found in apples, especially potassium. In chickens it has been shown to lower the pH in the digestive tract which will make an environment less welcoming to pathogens reducing common infections and increasing resistance to disease. Typical inclusion levels are 4.5 - 8.5 teaspoons of apple cider vinegar per gallon of water. This level of inclusion will also discourage algae growth. It should be given for 2-3 days at a time.

Various **plant extracts** have been studied for their antimicrobial abilities.

Essential oils are extracted from plants and possess the smell and characteristic properties of the plant. They are used chiefly in the manufacture of perfumes, flavors, and prescription drugs.

Herbs are flowering plants whose stem above the ground does not become woody and persistent. They are valued for their medicinal properties, flavor, scent, etc.

Botanicals are drugs made from a portion of the plant, such as the root, leaf, bark, etc.

Research with **plant essential oils** has yielded contradicting results, but there is enough evidence to suggest that they may have a role as a tool in combating bacterial diseases in poultry. Thyme, oregano, and garlic appear to have the most potential.

Slippery elm bark powder is a **botanical** used in alternative medicine in humans to assist with stomach upsets, including prevention of morning sickness often experienced by pregnant women. It

is said to be useful if your chickens have diarrhea or are off their food.

Some other natural ingredients that *might* be useful:

- Aniseed: Digestive enhancer and antimicrobial
- Cassia: Antiseptic, antifungal and antiviral; antibacterial, especially against *E. coli*
- Cayenne pepper: Appetite stimulant; antiseptic; digestive enhancement
- Garlic: Antimicrobial, antifungal; cholesterol reduction; circulation benefits
- Ginger: Reduces stress; positive effect on stomach activity; appetite stimulant; antioxidant
- Horseradish: Digestive stimulant; antiseptic; flavoring properties
- Juniper: Gastrointestinal antiseptic; aids kidney function; attractive flavor for birds

Additional Products Available for Health

There are a number of products containing diatomaceous earth (DE) that have been approved for use in organic poultry production. Rather than being used to control internal or external parasites, DE can also be used to improve conditions in a poultry house typically by neutralize ammonia. Reducing ammonia level reduces the level of stress to the birds, improves bird health, as well as increasing weight gains and productivity.

In addition to its uses in external parasite and ammonia control, DE is also used as a feed additive. DE has been reported to absorb methyl mercury, *E. coli*, endotoxins, viruses, some pesticide residues and drug residues. The pyrethroid insecticide residues may also bind to DE. The DE product passes unchanged through the digestive tract.

Ammonia control is important when poultry flocks are kept indoors, especially in the winter when there is limited opportunity for use of the pasture. Additional products are available to help control ammonia levels, improving the health and productivity of poultry. For example, extracts for the *Yucca schidigere* plant are often used for this purpose.

Summary

Many natural products are becoming available for use in flocks. However, care should be taken to make sure that they are effective, are safe for the birds, and do not cause residues or off flavors in the eggs produced.

Biosecurity is your best defense. Prevention is much more effective than treatment.