Epidemiology 101

by Jack Kittredge

The cheap food policy in this country is probably most evident in livestock raising systems. The vast majority of animals raised for milk, meat or eggs in the United States these days are housed in CAFOs (Concentrated Animal Feeding Operations) on factory farms. As a result, they are crowded inside buildings or into feedlots where conditions are conducive to the spread of disease.

Once an infectious agent (germ) is introduced into a host animal in such an environment, the potential for that infection to spread to other nearby animals is significant. The animals are close together (indoor space is expensive and factory farms try to minimize expenses), manure and urine are omnipresent, and ventilation is costly (especially on cold days when it requires extra heat for the buildings). The sterilizing effects of biodiverse soil, fresh air, and sunshine, which still exist on small family farms (especially among NOFA members), are too expensive for CAFOs to make available.

Accompanying the growth of this confinement system, naturally enough, has been the growth of outbreaks of disease at American CAFOs. Most notable have been cases of avian flu at large poultry operations -- which are located, naturally enough, primarily in the grain-growing breadbasket states. Despite the administration of antibiotics in most of the feed at these facilities, health conditions are so deplorable that when an outbreak occurs it rapidly overwhels the facility and the response is usually to kill all the birds immediately, dispose of the bodies, sanitize the place as best they can, and start over.

In the six months from mid December to mid June, 2015, an astonishing total of almost 50 million birds died this way, primarily in Iowa (31.7 million), Minnesota, Nebraska, Wisconsin, and South Dakota. Despite repeated warnings from government circles about the dangers to backyard home flocks from wild birds, only 6 small flocks reported deaths. The remaining 217 outbreaks were in large flocks, averaging over 220,000 birds each.

Such a level of outbreaks and death is called a disease epidemic. Many people are familiar with the term when used relating to human health, but the same exact science prevails whether the victims are people or livestock. I thought readers might be interested in learning a little more about the science of epidemics, or epidemiology.

An epidemic is defined as the spread of an infectious disease to a large number of host organisms in a given population within a short period of time. An example of a famous human epidemic is the bubonic plague, caused by a bacterium called *Yersinia pestis* and carried by fleas. It caused the “black death” in fourteenth century Europe as well as in parts of Africa and Asia, killing an estimated 50 million people. Another human example is the 1918 influenza pandemic or “Spanish flu” which killed 20 to 40 million people worldwide.

Why are epidemics rare?

What is particularly useful to understand about epidemics, whether among people or among animals, is the answer to the question: Why don’t they happen all the time? Infectious agents (germs) exist everywhere, and so do large populations of potential hosts. Why are epidemics so rare?

The answer is that there are two natural “firewalls” which prevent epidemics from occurring very often.

The first firewall is that of resistance or host immunity. As living creatures we all evolved in the presence of countless parasites and pathogens whose livelihoods depend on infesting or infecting us. As healthy hosts we have developed defenses such as immune systems which normally attack such agents and soon prevent them from disabling us. We may feel sick for a few days during the struggle, but if healthy we usually emerge victorious with stronger defenses than before.

The second firewall is that of self-defeating virulence. Parasites and pathogens are most successful if they do not kill -- they need a living host’s resources to multiply. A roundworm egg needs to be excreted by the host before it can develop into an adult roundworm. An infestation virulent enough to kill the host pig or sheep will also end the worm’s cycle of life. Similarly, viruses and bacteria need to multiply using the host’s energy and then trigger episodes of sneezing, coughing, diarrhea, etc. to be expelled and infect again. Dead hosts don’t cough. Thus pathogens unwisely virulent enough to kill their host will themselves die off, leaving their less virulent brethren to carry on their infective mission.

The Two “Firewalls” of Infectious Disease

A graph over time of the progress of an epidemic shows a low host resistance and a high level of virulence at the beginning. As time goes by, however, virulence declines as the most lethal agents or germs themselves die, unable to escape the bodies of the hosts they have killed. Only the ones which sickened the host, but did not kill it, are able to continue to infect new hosts. Also, as time goes by, overall host resistance builds as those who lack resistance die and the ones who are resistant adapt to the disease agent. Eventually the lines cross at the point where host resistance matches disease virulence and the epidemic degrades into a normal disease threat, indistinguishable from all the others we constantly experience.

(continued on page B-2)
Organic Animal Health
by Jack Kittredge

At a time when pastured poultry raisers are being urged by officials to keep their flocks indoors—to supposedly prevent their being contaminated by wild birds—it is encouraging to see the National Organic Standards Board trying to toughen the regulations regarding organic poultry by requiring them to have meaningful access to the out-of-doors. The NOSB recognizes that natural decontamination from sunlight, fresh air and bio-diverse soil are the best ways to promote animal vitality.

Organic standards for livestock health are primarily based on keeping the animals healthy in the first place, which is as it should be. No medications or interventions can be as effective as prevention, humane care and a proper diet. The articles in this issue are based on that organic principle. We analyze both disease and good health from the perspective of organic regulations and management.

Understanding basic epidemiology, and then looking at our current livestock system that relies on confinement and a miserly delivery of the crucial vital services—space, fresh air, clean water, appropriate feed, rapid breakdown of waste products—one wonders how American industrial agriculture could have gotten it so wrong. Is it any wonder that we experience massive, possibly millions of birds infected by disease in such facilities? This issue looks at that question.

We also discuss various infectious diseases and how they are introduced, spread, and what kind of damage they can do. But beyond examining disease, we consult experts on the best ways to raise livestock: the benefit of pasture, managing for the seasons, the approaches of holistic, complementary, alternative, homeopathic and herbal medicine, controlling internal and external parasites, when to vaccinate, avoiding and dealing with rabies, pneumonia, mastitis and pasture blight.

Only a minority of our readers raise livestock. But this issue contains information that we believe all thinking citizens should read and ponder. Organic animals in this country are generally raised without the use of antibiotics, pharmaceuticals, artificial hormones, or GMO feed. In that regard they are, sadly, in far better health than the general human population of this country. Can we learn, from understanding how livestock are treated, about improving the health of ourselves and our families? We believe the same forces govern good health in all animals, human or livestock. We invite you to read this issue and see if you don’t agree.

(continued from page 1)

What causes an epidemic?

Hosts and diseases usually coexist in a kind of equilibrium. Epidemioms, then, are caused by a sudden change in the host, the agent, or the environment. A genetic mutation in the pathogen reservoir can introduce a new, virulent strain of an existing pathogen. If a susceptible host is present, one which has not yet developed resistance to the new strain, an epidemic can result. Similarly, if a host population suddenly becomes weakened—by poor nutrition, overcrowding, stress—its resistance can drop and it can fall prey to infection. Finally, if something changes in the environment—flea-infested rats show up in the Mediterranean aboard ships from the orient, or millions of men are transported from all over the globe to fight a European war in the rain and cold of filthy, overcrowded trenches—many animalculae (tiny animals, meaning the germs of swamps…because there are bred certain minute creatures which cannot be seen by the eyes, which float in the air and enter the body through the mouth and nose and there cause serious diseases).

If a susceptible host is present, one which has not yet developed resistance to the new strain, an epidemic can result. Similarly, if a host population suddenly becomes weakened—by poor nutrition, overcrowding, stress—its resistance can drop and it can fall prey to infection. Finally, if something changes in the environment—flea-infested rats show up in the Mediterranean aboard ships from the orient, or millions of men are transported from all over the globe to fight a European war in the rain and cold of filthy, overcrowded trenches—many animalculae (tiny animals, meaning the germs of swamps…because there are bred certain minute creatures which cannot be seen by the eyes, which float in the air and enter the body through the mouth and nose and there cause serious diseases).

Transmission can also be indirect, via another organism, either a vector (e.g., a mosquito or fly) or an intermediate host (e.g., tapeworm in pigs can be transmitted to humans who ingest improperly cooked pork).

Nothing new here!

The risk to animals of harm from sickness is not new. Long before science possessed knowledge of microbiology, ancient thinkers were aware of the role of disease and infectious organisms in threatening the success of a livestock farm. The Roman Marcus Terentius Varro (116 BC – 27 BC) wrote three books on agriculture. In Book I, speaking about the ‘steading’ (farmstead), he says:

Especial care should be taken, in locating the steading, to place it at the foot of a wooded hill, where there are broad pastures, and so as to be exposed to the most healthful winds that blow in the region. A steading facing the east has the best situation, as it has the shade in summer and the sun in winter. If you are forced to build on the bank of a river, be careful not to let the steading face the river, as it will be extremely cold in winter, and unhealthy in summer.

Precautions must also be taken in the neighborhood of swamps because there are bred certain minute creatures which cannot be seen by the eyes, which float in the air and enter the body through the mouth and nose and there cause serious diseases.

“What can I do,” asked Fundanius, “to prevent disease if I should inherit a farm of that kind?” “Even I can answer that question,” replied Agrius; “sell it for the highest cash price; or if you can’t sell it, abandon it.”

Scrofa, however, replied: “See that the steading does not face in the direction from which the infected wind usually comes, and do not build in a hollow, but rather on elevated ground, as a well-ventilated place is more easily cleared if anything obnoxious is brought in. Furthermore, being exposed to the sun during the whole day, it is more wholesome, as any animalculae (tiny animals, meaning the germs which bring sickness) which are bred near by and brought in are either blown away or quickly die from the lack of humidity.”

Perhaps we should learn from the wisdom of the ancients when it comes to how we house and care for our animals?

Transmission

Transmission usually refers to the transfer of infectious microorganisms directly from one individual to another by one or more of the following means:

- droplet contact—coughing or sneezing on another individual
- direct physical contact—touching an infected individual, including sexual contact
- indirect physical contact—usually by touching a contaminated surface or soil
- airborne transmission—if the microorganism can remain in the air for long periods
- fecal-oral transmission—usually from unwashed hands or contaminated water or food sources due to lack of sanitation and hygiene, an important transmission route in pediatrics, veterinary medicine and developing countries.

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The immune system is such an incredibly important system in our daily lives and we rarely think of it, unless an illness arises. The immune system is a constantly changing, dynamic aspect of each of us and every animal life form, to greater and lesser extents. Frogs have immune systems, crayfish have immune systems, salamanders have immune systems, and many more. The immune system - as do other things, swordfish, haddock, penguins, otters, armadillos, loons, moose, cows, pigs, sheep, dogs, cats, and mice. The immune system separates every living being from the rest of the world, continually saying, “this is me, not you.” The immune system protects us every breathing moment that we are alive, whether we think of it or not.

So how do we maintain a vigorous, vibrant and effective immune system? Diet. Our diet has direct, immediate effects on our immune system. Why? Because our gut is the first stop for food to be broken down and absorbed into our system. Food either makes our digestive system happy or it doesn’t. If ingested food is irritating in any way, it will cause inflammation, which leads to leaks along the intestinal walls, letting toxins gain entry and causing serious damage. Most food, when absorbed normally, is sent with blood that drains the intestines through the portal vein to the liver. Then the liver performs major transformations of the ingested substances, forming simple nutrients. These nutrients are then sent into general circulation via the hepatic vein and to the heart to be pumped into circulation as nourishment. Along the intestines are immune glands called Peyers’ patches, essentially stores of lymphocytes (cells which are ready to attack bad foreign substances trying to gain entry into the body at the gut level. If the Peyers’ patches are constantly on high alert (due to poor diet choices and/or forms, like the Johnes bug) this will lead to inflammation and send signals to the rest of the body that something is wrong at the gate of entry. Additionally, diets that are constantly irritating to the stomach lining due to acidic pH (too much grain) will cause an inflammatory reaction in the intestine since the pancreas which neutralizes low level acidity is irritated or injured in the process. An inflamed gut makes for easier entry of things into the system (taxing the liver) that otherwise would stay in the intestinal tract and would be sent out with manure. Inflammation of the gut will also result in diarrhea or irregular stools.

Organs beyond the digestive system that are part of the immune system include the spleen, tonsils, thymus, lymph nodes and bone marrow. These are nourished regularly with each pump of the heart sending blood which has been originally filtered by the liver. Lymph nodes are the “regional cops” that react when there is a challenge - bacterial, viral, or parasitical - in that area of the body. They swell when they react. Think of the lymph nodes at the top of the throat or under your arm pits or where your legs attach to your torso - they swell when challenged and have lymph nodes in the same areas. Lymph nodes drain lymph fluid. Lymph fluid is made up of immune cells that have swallowed up bacteria, viruses or parasites, which is whisked away through the thoracic duct to the heart. The lymph system does not have its own circulation and sends build-up away only by the animal’s or person’s movement – that’s why exercise is always good: it helps to circulate everything, moving bad things away and moving good nourishing things in.

So how can we eat to best help our immune system at the ground level? Perhaps the main method that I’ve always thought was prudent was to eat to satisfy our genetics – that’s usually a good and easy start. For me, with Holland Dutch genetics on my mom’s side that goes back to the 1500’s in Friesland and my dad’s side for generations in Zeeland in Holland’s south, my system feels best when I eat fish, dairy products, and starches like potatoes and beets. It’s simply what my digestive enzymes are adapted to primarily. Obviously vegetables are part of the diet, too, but if I eat too many vegetables, my digestive system tells me that pretty quickly. Diets obviously will be different for people of different backgrounds.

So how should we feed ruminant animals? Ruminants, like cows and sheep, have eaten fresh green grasses and other forages, as well as the tops of maturing grass plants (seeds/grain) for countless generations. Dried versions of fresh grass – hay – is also well received by the rumen digestive tract as are silages of grass plants (corn is a grass). So maybe we should feed them in the same manner for them to have the healthiest digestive system and immune system: high forage intake with little/minimal grain. Unfortunately, modern Holsteins and Jerseys have been bred to eat relatively energy dense (grain) diets geared for high milk production whereas “minor” dairy breeds such as Milking Shorthorns, Linebacks, Normandies, Dutch Belted, etc. general- ly do quite well with only a little grain in their diets. The minor dairy breeds keep their body condition much better with low/no grain diets than Holsteans or Jerseys ever will. Cows which get skinny, due to not being bulked up on fiber but receiving too much grain (acid in system) and that are pumping out lots of milk will become run down, with their immune systems being only borderline effective. They may be more prone to high somatic cell counts remaining high rather than their system overcoming the challenge and returning to lower levels. Looking at the consistency of their manure or seeing undigested grain in it will tell you if they have rumen acidosis – which is the beginning of the downfall of their immune system.

As I’ve always said, you can never feed enough dry hay to dairy cows – it’s always OK to feed dry hay. Indeed, feeding even a little dry hay during feeding transitions will help digestion – and thus their immune system. You might want to keep this in mind when you transition to winter feeds in the fall.

Timely Treatment (March 2011)

Being that we who are in the organic realm don’t reach for antibiotics except in dire infections, how best do we prevent dire infections from arising in the first place?

The key words here are “dire” (meaning critical and immediately life threatening) and “prevent”. Obvi- ously we can’t prevent everything. Things happen as part of life - oddball things, infrequent things, and accidents. Prevention is great, but when it doesn’t work, then what? Clearly, there is a time line be- tween “prevent” on one end and “dire” on the other end.

The difference between prevention and a dire situa- tion then comes down to timely treatment, doesn’t it? In using natural treatments, timely is critical as natural treatments rely on a functional immune sys- tem. But if the immune system is overwhelmed, there is little chance for any treatment to work, let alone natural treatments.

Timely treatment doesn’t necessarily mean involving a veterinarian. Timely treatment does mean, however, that when the farmer gets the slightest hunch that something is wrong with an animal, prompt action is taken. For example, when feeding, if an animal simply doesn’t “look right” in the eyes or in whatever way you get a sense that something is wrong, for all means investigate the situation. This means that even if you have no idea that anything is wrong but some- thing inside you makes you think even a moment extra about that animal (or bunch of animals) - take the time to stop what you’re doing and quietly ob- serve the situation. Yes, stop shoveling out the silage or scooping out the grain or cutting the strings off the hay and just stand there for a good long moment. If you get no further indication that something is wrong, then resume what you were doing but keep a mental note about what got your attention. Then next time you are there again, stop everything, and simply observe and see if there is anything at all, no matter how slight, that is different than normal. Doing this will help guard against becoming numb to what is around you in your daily routine. I once read a very interesting statement: “where your attention is, there is your energy and where your energy is, there is your attention.” In other words, what you focus on is what you will likely be acting on. As you go through your day, are you really tuned in to your animals or is your attention on other things?

Unfortunately, it’s only too human to become numb to what we do routinely. This is especially true in fac- tories that assemble equipment. But when it comes to animals that are dependent upon us – be they dairy cows, pigs, chickens or pet dogs and cats – we simply cannot become numb if we want to be good stewards of life that surrounds us.

Again, this is especially critical for those caring for organic animals since reaching quickly for a strong antibiotic when something is finally noticed to be really bad is simply not a preferred situation. And remember that the organic consumers who are the steem for the organic sector have faith that organic farmers are taking the best possible care of their animals.

So if the first step of timely treatment is simply stopping and taking notice of something/anything which triggers your sense that something is not right, then what are some simple signs to look for? Obvi- ous things like a change in appetite, milk production level, color of manure and its consistency, breathing/ coughing, staying apart from other animals, red dis-
charge from a cow to calf, the way an animal walks, calves that don’t finish their bottle…all these things should trigger immediate investigation on the part of the farmer. If you don’t look into it now, your focus on doing other things will fade as you go to your next task. Further investigation usually means counting how many breaths an animal takes per minute (should be around 20-24 a minute for a calf that is sleeping (or is not specifically eating); taking the animal’s temperature (100.5-102.5 is the normal range for cows); reaching into a cow nearing birth to make sure everything is OK, personally looking into a calf hutch to see the amount and type of manure; lifting a hoof to evaluate it; etc. In other words, not just eyeballing an animal but actively checking an animal.

The above list is a set of basic activities that any good farmer will do to make sure that his/her animal is OK. Unfortunately, all the best intentions (like personally checking an animal) are meaningless unless there is active follow through. Follow through is the most critical component in timely treatment, especially with organic animals. If the calf that is not drinking also has diarrhea, what will you do and when? Wait until tomorrow because “it’ll get her hungry”? No. Or if a cow has a red discharge a couple weeks before freshening, wait until tomorrow morning to see if she’ll be calving in by then? No. If a cow is off feed and has a swollen quarter, just give her probiotics and see if she’s eating by next milking? No. Even with relatively tough animals like cows, life is fragile and things can go downhill surprisingly quickly. Calves are even more fragile. With the most critical conditions like mastitis, farmers can by all means start treatment. But even if a common condition like mastitis seems odd (like the quarter secretion smells horribly, indicating possible gangrene formation) – do not try to admire the situation or not go to the trouble of really closely observe your animals to nip things in the bud. Please realize that in the first 12 hours, this could mean having a 3-sided structure – a box pen full of animals (to keep warm and also for them to move about and freely lie down) is critical to not only keep warm but also for them to retain body warmth when lying down. Feed or age. And of course enough dry bedding is needed – any size degree rains can quickly damage animals – any size – so you need to be prepared. There is no such thing as having too much bedding or too many small animals outside is for this reason. This could mean having a 3-sided structure – a box pen full of animals (to keep warm and also for them to move about and freely lie down) is critical to not only keep warm but also for them to retain body warmth when lying down. Feed or age. And of course enough dry bedding is needed – any size degree rains can quickly damage animals – any size – so you need to be prepared.

While I have witnessed that there are dramatically fewer problems with organic dairy cows, farmers sometimes are lulled into a sense of complacency if nothing has gone wrong for a good stretch of time. We’re not talking about “living in a bubble” – living in a bubble that can feel pain and suffer very much like we do – demands that farmers take the extra few moments to look at an animal(s) and take prompt action so that dire situations do not arise. Stopping everything to quietly and closely observe your animals to nip things in the bud will add maybe 10 minutes of time to your work day.

Aren’t your animals worth that extra effort?

Getting Ready for Winter (October 2012)
The seasons are changing once again and it’s time to start thinking about getting animals ready to come inside. But not all animals do best indoors, depending on the group of animals being considered. Why is that? It’s critical to the foundations of health which I periodically talk about: dry bedding, fresh air, high forage diets and grazing.

So once grazing is finished, why and how would you keep animals primarily outside? Two of the other foundational pillars of health apply: fresh air and dry bedding. Certainly the freshest air will be outside. The main thing you need to keep in mind for animals outside is for drafts at ground level to be minimized. This could mean having a 3-sided structure so that all animals can get into the back areas (make sure individual hutches are designed) as those chilly 34°F degree rains can quickly damage animals – any size or age. And enough bedding is needed so they retain body warmth when lying down. Feeding enough dry matter for animals to extract calories is critical to not only keep warm but also for them to grow. Which groups of animals are then best suited to be outside? Pretty much all of them. Another reason for animals to be outside is simply for them to experience a change of environment from being confined to the same compound. Stopping, allowing their senses to experience what they normally would if they were in their natural state.

After enjoying fresh air since being born on pasture in the spring and perhaps having never even been inside at all yet in life, a box pen full of animals growing up in a building without good fresh air almost guarantees stress, thus negatively affecting the immune system. Add in the bedding not being added to enough or changed enough. Contact with damp concrete is the worst situation.

Complementary and Alternative Animal Treatments (December 2011)
There are many types of alternative treatments that can be used as stand alone treatments or in combination with each other. As a group, the American Veterinary Medicine Association calls them Complementary and Alternative Veterinary Medicine (CVM). My opinion is that we should use whichever mode of treatment that we feel intuitively drawn to. Or if there’re certain CVM therapies that make no sense to you whatsoever, don’t seem “real enough”, or make you uncomfortable, simply don’t use them.

A short listing of CVM groupings with specific some examples follow:

feed therapy - preventive nutrition, therapeutic nutrition, glandular therapy and orthomolecular medicine;
manual therapy – massage, acupressure, acupuncture, osteopathy, chiropractic, and physical therapy;
biotherapy – hyper-immune plasma, hyper-immune eggs, serum therapy, bee sting therapy, and pharmacologically treated leeches and maggots;
botanical therapy – western herbal medicine, traditional Chinese medicine, essential oils and aromatherapy;
energy medicine – Chinese lancing of hands, classical homeopathy, homotoxiciology, Bach flower remedies and non-traditional homeopathy.

This is not a complete list of course and there are combinations of treatment, like injecting homeopathic remedies at acupuncture points.

If you are drawn to a particular CVM, consider learning more about it to use it well. Or, if a CVM therapy makes no sense whatsoever, don’t seem “real enough”, or makes you uncomfortable, simply don’t use it. Just please don’t blindly “grasp at straws” in attempts to avoid standard, conventional therapy. Knowing a little about each may help you understand their potential role.

Acupuncture is a form of treatment which utilizes energy routes (meridians) that naturally course throughout the body, with certain points (acupuncture points) of the channel for healing to hopefully occur. You can be, then I choose from whichever CVM treatment seems best for each case. Anyone can do this. And while it’s satisfying to be part of a successful outcome, I don’t feel it’s actually me that gets the better treatment – that is up to Holy Spirit. I am just a channel for healing to hopefully occur. You can be, too. Using natural therapies honors God’s creation. But if there isn’t success, then hopefully we learn from the situation to prevent it from happening again. That’s the way I handled situations as a herdsman and still do as a veterinarian.

One last thing, and it’s mighty important, the intention with which we approach our animals is critical. I love what bio-dynamic farmer Andreas Reisen said, “As soon as you put your intention upon anything, it changes everything”. This is so very true. Animals can sense with an uncanny ability whether we as individuals truly want to help them or if we are just going through mechanical motions. Yes, animals can resist your attempts to treat them. But if we come to them from a calm heart rather than a busy head, we may better understand what ails them and all the big drug companies got their...
Herbal Medicine (September 2012)

The term herbivore is simply the scientific way of saying that an animal is biologically programmed to eat plants. Plants have been used for food forever by animals and people. Plants and herbs are spoken about in the Old and New Testament – to eat, to use for health, and as symbols within parables/stories. However in the Old Testament, all illness and healing was thought to be provided by God, so plants specifically for healing were not discussed much. There are about 125 references to plants and plant terms mentioned in the Bible (specific plants or words like vine, flowers, thorns, etc.)

Some people plant Biblical herb gardens with plants mentioned in the Bible. These kinds of gardens likely started in monasteries, when monks or nuns were the local providers of medical care to both nobility and peasants. In Italy, the Medici family was famous for their additions of plants and their derivatives to the world of medicines.

The most common route of administration is through the mouth – as it should be. There are two good reasons for this. First, it is the normal way that animals take in plants into their system. Thus their digestive tract is alerted and can respond since it’s biologically geared to take in plants anyway. Folks that watch animals on pasture know animals like to eat a variety of plant species - certainly not only orchard grass, white clover, and perennial rye but lamb’s quarters, smooth pigweed, soft seed heads of spiny red root, poison ivy, multiflora rose, quack grass, etc.

The second important reason to give herbal medicines in the mouth is that the sense organs are very concentrated in the head area. The sense of taste of the tongue, behind the jaw and along the throat that help process incoming information towards the immune system. Between the brain’s immediate response to the herb via the facial senses and the digestive tract’s ability to sift, sort and absorb plant material, it can easily be seen that oral administration is the best method of giving herbal medicines – whether they be tinctures, essential oils, dried herbs, teas or glycerites (glycerin as the carrier, which animals like much better than the alcohol of tinctures, which may give a burning sensation).

The list of dosages shown below is from a book I stumbled upon many years ago – it’s a gold mine of real information of plants used by veterinarians for animals “back in the day” – when botanical medicine was commonly used by veterinarians. It’s called The Book of Veterinary Doses by Dr. Pierre Fish (Slingerland – Comstock, Ithaca, 1930). Dr. Fish was Dean of the Cornell Veterinary School.

All doses shown are tinctures for oral administration in ml/cc.

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<thead>
<tr>
<th>Herb</th>
<th>Cow 15</th>
<th>Pig 15</th>
<th>Horse 8-15</th>
<th>Sheep 8-15</th>
<th>Dog 2-8</th>
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<tr>
<td>Arnica</td>
<td>15-30</td>
<td>4-8</td>
<td>0.6-1.3</td>
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<td>Belladonna</td>
<td>15-30</td>
<td>4-8</td>
<td>1-2</td>
<td>0.6-1.3</td>
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<td>Bryonia</td>
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<td>2-4</td>
<td>0.3-2</td>
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<tr>
<td>Calendula</td>
<td>15-30</td>
<td>4-8</td>
<td>1-2</td>
<td>0.3-2</td>
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<tr>
<td>Eucalyptus Oil</td>
<td>8-15</td>
<td>1-3</td>
<td>0.3-1</td>
<td></td>
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<td>8-12</td>
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<td>Ginger</td>
<td>30-60</td>
<td>8-15</td>
<td>0.6-4</td>
<td>0.6-4</td>
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<td>30-60</td>
<td>4-15</td>
<td>2-8</td>
<td>2-8</td>
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<tr>
<td>Licorice</td>
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<td>4-15</td>
<td>0.6-4</td>
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<td>1-2</td>
<td>0.3-0.6</td>
<td>0.06-0.3</td>
<td></td>
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<tr>
<td>Pokeweed</td>
<td>4-8</td>
<td>1.3-3</td>
<td>0.3-2</td>
<td>0.3-2</td>
<td></td>
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<tr>
<td>Quassia</td>
<td>30-60</td>
<td>4-12</td>
<td>1-4</td>
<td>1-4</td>
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<tr>
<td>Thyme Oil</td>
<td>2-8</td>
<td>0.3-2</td>
<td>0.06-1</td>
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<td></td>
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<tr>
<td>Vinegar</td>
<td>30-120</td>
<td>2-8</td>
<td>1-4</td>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td>Wintergreen</td>
<td>8-30</td>
<td>2-8</td>
<td>0.3-1</td>
<td>0.3-1</td>
<td></td>
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</tbody>
</table>

In their widely acclaimed book, Veterinary Herbal Medicine (Mosby, 2007), Dr. Susan Wynn and Dr. Barbara Fougere also show dosages of herbs to give. The doses shown in the table are from modern day veterinary practitioners from all over the world that use herbs. What’s really nice is that these doses match up fairly well with the doses used in the 1930’s with dose for tinctures being between 1 - 3 Tbsp, which is approximately 15 – 45 cc (1 Tbsp = 15cc & 1 tsp = 5cc).

### Preparation

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Goat</th>
<th>Cow</th>
<th>Horse</th>
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</thead>
<tbody>
<tr>
<td>Decoction (tea)</td>
<td>4 oz</td>
<td>12 oz</td>
<td>8 oz</td>
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<tr>
<td>Extract tablets</td>
<td>3-5</td>
<td>10-15</td>
<td>10-15</td>
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<tr>
<td>Freeze-dried granules</td>
<td>1 tsp</td>
<td>2 Tbsp</td>
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<tr>
<td>Tincture</td>
<td>1 tsp</td>
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<td>2-3 Tbsp</td>
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sprouting seeds seems like a great opportunity to get fresh high quality feed to your animals year round. I’ve always liked eating sprouts myself and knowing a bit more about them now, I think I’ll ramp up my own intake of them!

Sprouting seeds brings starch into the rumen, which can cause problems like rumen acidosis, whereas sprouted grains provide starch. Starch and sugar are both forms of energy, but the sugars are more friendly to the digestion process.

There have been many experiments on how long to grow the sprouted grain. It seems that day 6 is when they should be harvested – this is easy to remember for the 7th day is for rest. The biological reality is that the starch reserves of the dry grain are used up by that point. Beyond that time you need soil. Also, the composition of plants changes by beyond day 6. In general, 285 pounds of dry grain will yield 1 ton of sprouted grain (with soaked up water). Thinking in terms of color and flavor, a pound of grain will yield 1.4 pounds of sprouts in 6 days and its fresh, green feed.

Let’s look at the nutritional profile of sprouts. Crude protein in barley grain is about 13% whereas when sprouted it’s about 16%. Vitamin E, a vitamin which is universe low in stored feeds, can increase from about 3mg/kg in barley grain to 62mg/kg when sprouted. Vitamin E is critical to proper immune system functioning. Beta-carotene goes from 4.1mg/kg in barley grain to 42mg/kg when sprouted. Beta-carotene is the starting compound for vitamin A and also has important immune system functions. Bioflavonoid, which helps glucose production, as well as keratin production for hoof health, increases from 0.16mg/kg to 1.15mg/kg. Free folic acid, or vitamin B9 goes from .12mg/kg to 1.05mg/kg.

Being live feed, sprouts also increase enzyme levels, which gives better digestion and absorption. As far as protein considerations, soluble protein is converted to by-pass protein, thus less rumen ammonia and less milk urea nitrogen. Sprouted grains also have increased amino acids, such as glutamine and proline, which are converted to by-pass protein, thus less rumen ammonia and less milk urea nitrogen. Sprouted grains also have increased amino acids, such as glutamine and proline, which are converted to by-pass protein. Sprouted grains when fed dry, can be fed as a meal, increased 10-12% to meat following long periods of need. Vitamin E, a vitamin which is universe low in stored feeds, can increase from about 3mg/kg in barley grain to 62mg/kg when sprouted. Vitamin E is critical to proper immune system functioning. Beta-carotene goes from 4.1mg/kg in barley grain to 42mg/kg when sprouted. Beta-carotene is the starting compound for vitamin A and also has important immune system functions. Bioflavonoid, which helps glucose production, as well as keratin production for hoof health, increases from 0.16mg/kg to 1.15mg/kg. Free folic acid, or vitamin B9 goes from .12mg/kg to 1.05mg/kg.

Parasites: Flies (August 2012)
Parasites love heat and humidity. Unless you’re in the drought stricken areas that are extremely dry, the very warm summer temperatures this year are helping parasites multiply in very short times.

Parasites can be internal or external. Important internal parasites of livestock usually bring to mind stomach worms and coccidia. There are many more, but those probably cause the most problems. External parasites bring to mind flies, lice and mange. Flies torment animals during the warm season while the effects of lice and mange tend to be seen during the indoor housing times of colder season. Horn flies are smaller than other kinds of flies and are usually found on the bellies and backs of cows; horn flies deposit eggs in fresh manure and take 9-12 days to develop into an adult. They take 10-12 blood meals per day and can transmit Staph aureus between animals. Face flies also lay eggs in fresh manure and are adults in 14 days; face flies have been found to carry over 30 bacterial diseases and

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stable flies are found on the lower body and legs of cattle and take about 2-3 blood meals a day; stable flies prefer aging manure and bedding or round bale feeder areas to deposit their eggs. Cattle bunch up trying to avoid painful bites. House flies will use a variety of organic materials to lay their eggs and it takes about 7 days for them to become adults.

With these things in mind, maybe it is easier to see why I have always promoted clipping and/or dragging pastures to destroy the manure pies and allow even re-growth of pasture. Just wait 2-3 days so the dung beetles can drill manure into channels they create in the soil. This action of dung beetles is incredibly important. Applying basic biological concepts such as the action of wind will reduce fly burdens and drying-by-dragging will reduce the habitat of parasites in pasture, making your animals happier and more productive.

Parasites: Stomach Worms (September 2009)

Unfortunately, flies aren’t the only parasites. The ones which actually do the most harm cannot be seen. These are the stomach worms that can really build up in young stock and on the pastures. The life cycle of these pests is to be taken in by grazing animals, grow and reproduce within the digestive tract of the animals, and be deposited back out on the pasture to be taken up again by animals to repeat the cycle. This can happen many times to the same animals if confined in a small paddock. Unfortunately, the population of the worm larvae sky rockets as the growing season continues.

In summer, unless your paddocks are scorched, parasites are thriving and sending millions of eggs out onto pasture as your herd animals drop their manure on the ground. The eggs hatch in a few hours, soon crawl up the blades of nearby grass hoping to be eaten by animals as they graze, then start their life again in the host, sucking blood from the stomach walls. This is basic biology and there’s no getting around it completely. This does come to a halt after one to two good killing frosts. Prior to that, however, thousands of tiny larvae are nearly jumping off the tips of the grass into the animals.

Parasites (of any kind) will always be present wherever there is a high animal density in a contained area. Only the free roaming bison on the American Plains could constantly move along and not encounter heavy pressure of internal parasites. There are ways, however, that you can reduce the pressure while also keeping your animals healthier by eating better. How? By using rotational pasture management so animals get new paddocks every 12 hours and by giving the paddocks a rest once grazed in order to re-grow. Just as important, dragging pastures to spread out manure will allow quicker drying out of manure to kill the fragile microscopic larva crawling about. The ideal time to drag out manure pies is 2-3 days from when the cows are on the paddock. This will not hinder pasture re-growth and more importantly will allow the dung beetles to do their work. This timing also allows time for horn flies and face flies to lay their eggs, so eggs will be hatched and the fragile young larva can also be killed by spreading out the manure pies and quickly drying out their living areas of internal parasites and developing flies.

If calves born in February through April and weaned three months later are sent out back to the regular old paddock where such animals always go, they will quickly become infested with internal stomach worms since they have no immunity to them. Typical signs are pot-bellied calves with obvious bones whose hair coat may be rough looking and reddish black, along with diarrhea and dried manure on back legs that look kind of thin. If you see this in your young animals out on pasture, it is an almost sure sign of a parasite infestation. Animals in the age group between one month after weaning up to about 10-12 months old are the most likely to become infested. Once past this age, they tend to build natural parasitic worms contain peptides that suppress the host’s immune system, presumably to make fighting the worm harder.
immunity and can then live in balance with the parasites that they encounter. For the first time ever this year I saw actual blood engorged (dark reddish) stomach worms. They were no longer than about 1 cm long. Looking at them under a microscope they are really horrible looking little monsters, with teeth lining a round mouth which rips holes into the stomach wall where it sucks blood. These particular ones were found in a water trough by a farmer who was nicely scrubbing the water tub out. I was completely amazed.

Unfortunately, the smaller the land base, the more likely it is that parasites will infest young stock as similar groups are placed in the same small lots year after year. Animals that are carrying a burden of internal worms will have their immune system drawn down. This can be troublesome if there are sudden changes in weather (cool damp weather will likely trigger the calves to start coughing) and fly burdens will likely cause pinkeye. Only on rare occasion have I seen an animal so severely parasitized that they are near dead due to anemia (loss of blood due to parasite action). This will present as an animal that already had looked like I described above (but was either not treated or at least not effectively treated) which will progress to having a swollen looking jaw (fluid filled), very white mucous membranes (mouth, eye sockets, vulva) and be extremely weak – most likely lying down. Sometimes these young animals will also have ulcers in their mouth.

So how do we prevent internal parasite build-up? All the above that I wrote can be prevented pretty much by really excellent feeding. There certainly are farms which do not have parasite problems (not counting the farms that can routinely use wormers and medicated feeds). The farms which have weaned calves that look good usually are those farms which wean calves no sooner than three months of age and that were feeding whole milk as it provides the absolute best nutrition. And of course those farms using nurse cows with calves will have stronger calves to begin with going into the weaning process. It is those farms that pay attention to detail in the continued proper feeding of their weaned animals that will be most satisfied. Without doubt, weaned animals up to 10 months old are generally the weakest link in the chain on organic farms. Clipping pastures, rotating calves from paddock to paddock, using chickens in the paddocks to peck apart the manure paddies, having diatomaceous earth as part of a salad bar of at least 6 free choice minerals type fresh water, high energy stored forage to complement the high protein pasture and a touch of grain will all contribute to healthy calves that won’t become infested with internal parasites. If for no other reason, feeding excellent levels of nutrition will counteract the drain they will undoubtedly experience in the summer months due to the farm’s resident parasites.

Treatments can range from materials that are high in tannins like black walnut hulls, to better designed mixes like Fertrell’s dewormer mix that’s added to the feed, to Ferro which has extremely high levels of tannins, iron and minerals. If these aren’t working, then ivermectin is still allowed for organic livestock – if all other measures appropriate for organics have been tried. Bear in mind however, that ivermectin is totally poisonous to the dung beetle population. If a farm is found to be using ivermectin on a certain age class of animals every year, most certifiers would rightly ask to see what the farm is doing to prevent parasite pressures from developing. One way, at least in areas with high livestock density, would be to have your animals custom raised in an entirely different area.

As the season changes shortly, young animals that may be carrying parasite burdens are especially susceptible to damp chilly air, especially if brought indoors once the pasture season is over. Never, ever bring young stock back inside to the same building that shares air with older animals. A rule of thumb is that once an animal leaves the main barn where it was as a youngster, always raise it outdoors (with proper shelter) and bring it back into the main adult barn only when it is ready to join the milking string. Too many times I have been called to see sick and coughing parasitized animals that were brought back into the barn in October or November when the weather got bad. Major mistake. By feeding animals well and keeping them outdoors in managed pastures and shelters, your young stock will grow up to become healthy, productive members of your dairy herd.

To organic farmers everywhere for treating their animals and the earth with care and treating us with some of the finest organic ingredients around, thanks.
Parasites in Calves (September 2011)

I really think that parasitism, whether internal (stomach worms and coccidia) and external (flies and mange) are truly a weak link in the chain of organic livestock health and growth. It must be remembered that if pasturing animals in the same area for more than a year, there will be parasites waiting for each group as they arrive. Pastures look really nice early on but those stomach worm larva are invisible to our eye and are out there rapidly multiplying, eating the greens that are out there eating the forages. That’s because the stomach worm larva crawl to the tips of the grass blades to be eaten by the ruminants. So let’s do our best to defend our ruminants, whether cattle or sheep, from these parasites. The disease cycle all over again (to feed and reproduce themselves within the animal’s digestive system).

This is why I am in favor of clipping pastures or at least dragging pastures with a set of chains: it smears out the manure paddy and those larva will dry out in the sun and wind and not live to climb up the grass blades to be eaten and taken in again.

What do your calves on pasture look like right now? Are they skinny and do good nippy to be wormed as soon as possible? Frankly, I’ve noticed that when you weaned them or set them out to pasture? Or do they look a bit more ragged now - perhaps a bit pot-bellied, their hair being dry looking and red or brown instead of black as it should be? With thin back leg muscles and some dried diarrhea up high on their legs and tail? If so, these are classic signs of internal stomach worm infestation.

It would be wise to catch a few up and look in their eye sockets to see how pink or pale white the socket is. If the whites go gray, then look at the eye looking at the whites of their eye sockets will reveal the degree of their health. Calves hide it until later.

In organic agriculture, with the requirement of ani- mals 6 months and older to get a minimum of 30% dry matter from pasture over the grazing season, it is only a matter of time before the young stock, which are very susceptible to stomach worm infestation, will become infested if pasture management is not top notch. A big part of it all is proper feeding to ensure adequate energy intake while on pasture. This can be from high energy forages or giving some grain. The immune system depends heavily on proper daily energy intake. It should be noted that calves and young stock are on low level of immune system function. Vitamin C is also an important vitamin that helps the cells of the immune system function better. Vitamin C is also a powerful antioxidant that helps the cells of the immune system fight off the bad bacteria to restore equilibrium. Immune system cells, having a kind of “radar”, are drawn to the sites of infection. These immune system cells, having a kind of “radar”, are drawn to the sites of infection. These immune system cells, having a kind of “radar”, are drawn to the sites of infection. These immune system cells, having a kind of “radar”, are drawn to the sites of infection.

I think a good goal is to raise calves that do have some challenge with stomach worm larvae in the pasture, yet are managed and fed well enough that instead of becoming infested, they instead build immunity. That’s the true level of health of a cow. To this end, the young stock should be wormed off of feed won’t be making enough vitamins. Healthy cows do make their own vitamins in the pasture, however, the vitamin content of stored feed for a full year may not achieve appropriate levels. Any mixed ration would help boost the immune system. Vitamin E has been shown to increase the immune system function.

I treated cases of pneumonia this month in cows and have been called from out of state for even more severe cases. With the springtime, more fluctuating weather will no doubt occur and negatively affect animals before good weather spring- weather arrives. Let’s look at general prevention and then biological treatment options for cases of pneumonia.

First it needs to be stated that in the normal animal there are “good” and “bad” bacteria that line the respiratory tract, with the good ones keeping the bad ones in check when the animal is in good health. But when the animal’s immune system is stressed or overwhelmed from the respiratory tract lining, this will allow the bad bacteria to gain an advantage, result- ing in coughing (carrying – and potentially in pneu- monia. I say “potentially” because if environmental causes like stale air, drafty air and/or dampness is present, then coughing does not necessitate proceed to pneumonia. Importantly, if you can get an animal into the situation that it can breathe fresh air - if the weather is pleasant – it can stop the downward process. This is why it’s important to NOT keep animals indoors all winter long. It’s much better to let them go out to exercise and have a lot of mud, by all means put animals outside to get fresh air and some exercise. And I don’t mean for only an hour. Put them out for the whole morning or what have you. This is what I refer to as the general health. As most people know, it’s very uncommon for calves in hatcheries to get respiratory problems – they learn in and out from their hatch whenever they please.

Let’s consider the role of the immune system. In the course of responses to disease, the animal’s immuno-competent yet never has been previously challenged by the bad bugs, it takes about 10 days for the animal’s own antibodies to rally and start fighting the bad bugs. Unfortunately, only about 50% of most farmers will not do a strict quarantine and the animal can come down with the virus or not. Unfortunately, there’s much less chance for recovery – leading to pneumonia. Vaccination is still the key way to prevent pneumonia. Unfortunately, there’s much less chance for recovery – leading to pneumonia. Vaccination is still the key way to prevent pneumonia. Unfortunately, there’s much less chance for recovery – leading to pneumonia. Vaccination is still the key way to prevent pneumonia. Unfortunately, there’s much less chance for recovery – leading to pneumonia. Vaccination is still the key way to prevent pneumonia. 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The warming weather and associated dampness has had me treating coliform mastitis lately - so this month’s column will focus on the causes, prevention and treatment of this very frustrating problem that pops up at times. The infrequent nature of coliform mastitis lends itself to not spending much time thinking about it. And yes, I do mean simply by maintaining excellent daily milking procedures and udder hygiene, coliform mastitis is normally prevented.

Most times, it’s the fresh cows which seem to come down with this problem. Why might this be? Perhaps the most important factor is the naturally occurring immune suppression of cows preparing to calve and those which have recently calved – basically for 2 weeks on either side of calving. Cows are simply more susceptible to infectious problems during this time. Add in the usual decrease in daily dry matter intake (lack of “groceries”) combined with the immense demands placed on the entire system due to rapid increase in milk production and problems can quickly get out of hand. This is especially so with coliform mastitis since the bugs causing the problem double themselves every 20 minutes. That’s the internal angle.

What about the environment the cow is in? Coliform bugs can be anywhere in the environment – manure, bedding and water. It’s just the way it is. Using bedding materials which are inert is helpful: sand is the best. In the middle is probably straw, which usually doesn’t cause much in the way of coliform mastitis problems in my experience. At the bad end is sawdust: if damp for any reason it can cause major flare-ups. Sawdust is the most common bedding I see associated with coliform mastitis. I have also seen a horrible outbreak with ground peanut hulls years ago - it was advertised to lower somatic cell counts. Upon laboratory analysis it had zillions of klebsiella-type coliforms! Adding very fine limestone (calcium carbonate) to any commonly used bedding material can help to change the pH and reduce coliforms.

Pasture Bloat (April 2013)

As we soon get into the early pasture season, there are some things that come to mind for cow health. Many folks may think “what problems can there be with cows on pasture?” Well, believe it or not, there can be some. Above all, changing the diet of the herd radically by putting them all out on lush pasture can cause digestive upset. Try putting cows on grass for only a few hours a day at this point while still feeding the dry hay and/or long leaf baleage in the barn. Moving cows quickly through fields at this point is also good so they don’t trample young growth too much. Keep them in a paddock for an hour or two and move on. Transitioning cows to 12 hour grazing by going from 2-3 hours per day in pleasant afternoons to both morning and afternoon grazing over a week’s time. It’s understandable that people want to get their cows out of the barn but try to do it in a way that doesn’t hamper the early growth of your pastures, otherwise you might be shooting yourself in the foot.

Once pasture is in full gear, we often notice cows with pipe stream “pasture” manure. What does this mean? Simply put: excessive rumen degradable protein. Fast growing grass in the vegetative state is simply chock full of protein – actually way too much for a cow’s rumen to remain healthy. All that protein from the pasture creates ammonia as it’s broken down. That ammonia can seep through the rumen walls. The cow’s system takes care of it by converting the ammonia to urea. This urea is then in the blood stream and is called blood urea nitrogen (BUN). This BUN is mostly turned into urine and excreted. But the BUN also freely moves into the udder and creates milk urea nitrogen (MUN). This whole process is the cow’s way of getting rid of too much protein intake – but transforming the excessive ammonia costs the cow biological energy and lowers milk production.

This is part of the reason why we often see cows on prime pasture getting lean. But we can reduce this excessive drain on their system in two simple ways, by making sure (1) that there is enough energy for them to balance out the excessive protein being taken in and (2) by slowing down the rate of passage through the rumen by feeding effective fiber. The best effective fiber is dry hay – but cows don’t tend to like the dried feeds when they have lush green salad to enjoy in the spring time. They will eat it, though, if you pour or spray diluted molasses on it – and the molasses will provide energy to the rumen as well. And while many farmers that are into grazing do not like the thought of corn silage (even though it’s a grass itself!), corn silage actually complements grazing well because it provides energy and fiber... and cows still like it even when on pasture! Regardless, balancing intake protein, fiber and energy is critical for your cow’s sake.

While cows on pasture are athletes and very fit due to exercise, folks also need to keep in mind basic biology. The best time to put cows onto a field is when you’d make hay: for instance, when the clover is about 7/8, the alfalfa is early bloom at 10-14” and orchard grass is 12-18” high. At this height it yields about 250 lbs dry matter per inch per acre. At that height, it provides the best quality according to brix measurements. It also provides some effective fiber right from the pasture itself. Give it some thought. If starting to graze pasture 24” or taller, it’ll be too mature to support good levels of milk production. Draining cows of milk twice daily means feeding your cows correctly. The New Zealand method of grazing 4-8” tall grass simply doesn’t work in southeast PA due to excessive protein, lack of fiber and lack of energy. But it sure could fit cooler areas that simply cannot grow grass any taller.

I have a couple other thoughts prior to full spring grazing. Every year I usually get at least a few calls from alarmed farmers that cows are suffering from pasture bloat. Pasture bloat is a very real problem but easily prevented by feeding your cows correctly. Pasture bloat results from putting cows (especially hungry cows) onto legume dominant pasture for a few days in a row and is most likely to happen in the cooler early or late times of the season, though it can happen mid-summer. Always feed your cows some dry hay or long leaf baleage 1/2 hour prior to putting out to pasture regardless of pasture species as the fiber mat in the rumen is vital for cow health. Pasture bloat is even more likely if putting cows onto frosted legume pasture – always wait 2 hours after frost is off prior to putting cows on legume dominant pasture.

We all know that grazing is more of an art than a science. But just because cows are on green grass doesn’t necessarily mean that their rumens are healthy and happy. Perhaps one of the easiest ways to watch rumen health is to let your cows tell you how they are doing. Do they chew at least 60 chews per cud that they bring up? I think the easy way to do this is to count the chews they chew of a cud right after they bring it up. Do it with a bunch of cows. If chewing less than 50 chews per cud they are lacking fiber for the rumen mat. This is actually vital biological information to know. Also, are at least 60% of the cows chewing an hour after eating? And, what does the manure look like? With good digestive health management should not shoot out of cows like water from a hose but instead should “set up”. It also shouldn’t have any grain chips in it. That’s easy to do - simply count the chews they chew of a cud right after they bring it up. Do it with a bunch of cows. If chewing less than 50 chews per cud they are lacking fiber for the rumen mat. That’s actually vital biological information to know. Also, at least 60% of the cows chewing an hour after eating? And, what does the manure look like? With good digestive health management should not shoot out of cows like water from a hose but instead should “set up”. It also shouldn’t have any grain chips in it. That’s easy to do - simply count the chews they chew of a cud right after they bring it up. Do it with a bunch of cows. If chewing less than 50 chews per cud they are lacking fiber for the rumen mat. I think the easy way to do this is to count the chews they chew of a cud right after they bring it up. Do it with a bunch of cows. If chewing less than 50 chews per cud they are lacking fiber for the rumen mat. That’s actually vital biological information to know. Also, are at least 60% of the cows chewing an hour after eating? And, what does the manure look like? With good digestive health management should not shoot out of cows like water from a hose but instead should “set up”. It also shouldn’t have any grain chips in it. That’s easy to do - simply count the chews they chew of a cud right after they bring it up. Do it with a bunch of cows. If chewing less than 50 chews per cud they are lacking fiber for the rumen mat. That’s actually vital biological information to know. Also, are at least 60% of the cows chewing an hour after eating? And, what does the manure look like? With good digestive health management should not shoot out of cows like water from a hose but instead should “set up”. It also shouldn’t have any grain chips in it. That’s easy to do - simply count the chews they chew of a cud right after they bring it up. Do it with a bunch of cows. If chewing less than 50 chews per cud they are lacking fiber for the rumen mat. That’s actually vital biological information to know. Also, are at least 60% of the cows chewing an hour after eating? And, what does the manure look like? With good digestive health management should not shoot out of cows like water from a hose but instead should “set up”. It also shouldn’t have any grain chips in it. That’s easy to do - simply count the chews they chew of a cud right after they bring it up.
The Modern Ecology of Avian Influenza

by Jack Kittredge

Many emerging infectious diseases in human populations originate among animals. Attention has often focused on wild animal reservoirs, but most zoonotic pathogens (ones which can be passed between animals and humans) of recent concern to human health either originate in, or are transferred through domesticated animals raised for human consumption. A case in point is Highly Pathogenic Avian Influenza (HPAI), which has resulted in massive poultry-house culls in recent years.

Intensive food animal production systems and their associated value chains dominate in developed countries and are increasingly important in developing countries. These systems are characterized by large numbers of animals being raised in confinement with high throughput and rapid turnover. Although not typically recognized as such, industrial food animal production generates unique ecosystems—environments that may facilitate the evolution of new pathogens and their transmission to human populations.

It is often assumed that confined food animal production reduces risks of emerging diseases. Evidence suggests, however, that these industrial systems may increase animal and public health risks. Moreover, the economic drivers and constraints faced by the industry and its participants must be fully understood in order to develop effective preventive policy.

The high-profile emergence of human diseases from animal populations, such as Nipah virus infection in 1999 in Malaysia and Singapore, SARS in 2002 in China, and HPAI from 1997 to the present around the world, have heightened public awareness of linkages between animal populations and human health.

Yet the environments of domesticated food animals—systems that are driven by unique ecological, social, and economic factors—are not usually recognized as ecosystems in and of themselves, with intense interactions between animals, humans, and pathogens. But the industrial food animal ecosystem is exactly that—a distinct entity consisting of organisms (including humans, domesticated and wild animals, and microorganisms) interacting with each other and an anthropomorphically designed environment designed to maximize profit rather than biological sustainability.

Avian flu exemplifies how ecological conditions of animal husbandry and the food production supply chain can influence health risks for human populations worldwide. In the industrial farm, pathogens can move by unregulated and unrecognized pathways, such as on airborne dust, via nuisance insects, in animal wastes utilized in agriculture and aquaculture, in contaminated water, and by wild animals.

While individual countries have taken steps to contain outbreaks at the farm level and to reduce local dissemination of the flu, the globalized nature of the food animal production industry and supply chain must be recognized for its role in augmenting rapid transmission of pathogens across long distances.

Modern Industrial Production in Poultry-Houses

In industrial poultry production thousands of birds of similar genotypes are raised for one purpose with rapid population turnover at one site under highly controlled conditions, often in confined housing. Such industrial-scale production is expanding rapidly in Asia, Africa, Latin America, North Africa, and the Near East, and is led by both national and multinational corporations seeking expanding markets of increasingly urban consumer populations within these countries. Concerns have been raised over the risk of raising large numbers of birds this way, given the relatively weak veterinary and public health infrastructure in some of these countries.

In the industrialized countries, the vast majority of chickens and turkeys are now produced in houses in which thousands of birds are confined throughout their lifespan. Increasingly, pigs and cattle are also raised under similar conditions of confinement and high density.

For poultry (and pigs), industrial production is organized in stages with separate primary breeders, multipliers, and producers (often contract growers). A small number of globally operating companies form the apex of the breeding pyramid. The feeds supplied to animals in industrial operations are highly formulated and substantially different from the foraged feeds traditionally available to these same species. This sector is also dominated by a small number of commercial enterprises.

The consolidation of poultry and pig production was undertaken for reasons of competitive advantage and has greatly affected the geography of food animal populations. In the USA, poultry production is highly concentrated in the southeastern states, with more than 40% of total production occurring in Georgia, Arkansas, and Alabama. Reasons for locating in the south include less restrictive environmental and public health regulation as well as access to farmland for disposal of manure and a lessened need for heating in winter when ventilation fans bring in cold air. Similar trends have occurred worldwide.

The geographic concentration of pig and poultry production has also resulted in regional and global movement of animals and their products. In the industrial model, different production stages are often undertaken at different sites, requiring a significant amount of live animal transfers, some of which cross national borders.

These transfers provide significant opportunities for interactions between large populations of confined animals, which may contribute to the evolution and transmission of infectious pathogens. This may be of particular relevance to the evolution of human-to-human transmissible avian influenza, as occurred in the 1918 pandemic.

Furthermore, animals held in confinement produce large volumes of waste. Much of this waste, which contains many pathogens, is disposed of on land without any requirements for pretreatment, posing an opportunity for human contact and transmission to wild animals, both avian and mammalian.

The fact that poultry production has been transformed from small-scale methods to industrial-scale operations has important consequences. There is substantial evidence of pathogen movement between and among these industrial facilities, release to the external environment, and exposure to farm workers. This challenges the assumption that modern poultry production is more biosecure and biocontained than backyard and smallholder operations in preventing introduction and release of pathogens.

History of the Emergence of Novel Influenza A Viruses

Avian influenza (AI) is an infectious viral disease of birds (especially wild waterfowl such as ducks and geese), often causing no apparent signs of illness. AI viruses can sometimes spread to domestic poultry and cause large-scale outbreaks of serious disease. Some of these AI viruses have also been reported to cross the species barrier and cause disease or subclinical infections in humans and other mammals.

AI viruses are divided into 2 groups based on their ability to cause disease in poultry. Highly pathogenic avian influenza results in high death rates (up to 100% mortality within 48 hours) in some poultry species. Low pathogenicity viruses also cause outbreaks in poultry but are not generally associated with severe disease.

Wild aquatic birds are believed to be the primary reservoir of influenza A viruses, and all influenza A viruses in mammals likely have ancestral links to avian lineages. An important feature of influenza A viruses is their capacity to undergo molecular transformation through recombination and reassortment, which facilitates adaptation to new host populations and thereby the potential to cause major disease outbreaks in humans and other species. Influenza A viruses are classified on the basis of their HA (hemagglutinin) and NA (neuraminidase) antigens and their pathogenicity to chickens. Strains that cause severe disease and high levels of mortality are classified as highly pathogenic avian influenza while viruses causing milder disease in domesticated poultry are classified as low pathogenic avian influenza (LPAI).

The transition from LPAI to HPAI can result from a single mutation affecting a surface protein. The probability of such a mutation is amplified in the setting of industrial poultry production due to the rapid viral replication that occurs in an environment of thousands of confined, susceptible animals.

Pigs may potentially assume a separate important role in the emergence of novel influenza A viruses, as they can be infected by both avian and human viruses. Note the proximity of concentrated poultry and swine operations as a source of disease risk from influenza A viruses, although to date there have only been reports of avian influenza viruses in pigs, not swine influenza in poultry.

The A(H5N1) subtype, a highly pathogenic AI virus, first infected humans in 1997 during a poultry outbreak in Hong Kong. Since its widespread re-emergence in 2003 and 2004, this avian virus spread to Europe and Africa and has become entrenched in poultry in some countries, resulting in millions of poultry infections, several hundred human cases, and many human deaths.
Food Animal Production Workers at Risk

A number of recent studies demonstrate that influenza A viruses from animals can move across the animal-human interface in the context of food animal production and processing.

While fewer people are now engaged in animal husbandry at fewer sites, the high throughput and confinement of highly concentrated animal populations increases the intensity of microbial exposures for farmers, their families, farm workers, veterinarians, and others in contact with these operations.

The conditions of work provide many opportunities for both worker infection and transfer to others in the community. There has been minimal attention to animal-human interactions associated with the operation and management of broiler poultry houses. Many workers are provided little or no protective clothing or opportunities for personal hygiene or decontamination on-site. Studies of poultry house workers in Maryland indicate that workers take their clothes home for washing.

Environmental Contamination Pathways

In addition, the design and operational requirements of large-scale swine and broiler poultry houses result in other compromises of biosecurity. Through multiple pathways, pathogens move in and out of these facilities and are then available for exchange among wild avians, domestic avians, swine, and other animals as well as humans.

The rapid spread of avian influenza among poultry flocks can be partly attributed to air exchanges between confinement facilities located within several hundred meters of one another. Tunnel ventilation systems, which are increasingly used in the U.S. industry, consist of eight 1-meter-diameter fans positioned at one end of the building. These fans generate large quantities of aerosolized dust and emissions of small particles from broiler houses.

Other points of release and interspecies transfer include methods of handling animal house wastes, the use of poultry house wastes in aquaculture, and open-truck transport of food animals from farms to processing plants. Pathogen contamination of shipping containers and trucks, which are not enclosed, is known to occur, and animal stress during transport increases pathogen shedding.

Food Animal Wastes and Biosecurity

In addition to the production of animals for human consumption, industrial farms also produce large amounts of animal waste, or biosolids. Animal biosolids contain a range of pathogens that may include influenza viruses, which can persist for extended periods of time in the absence of specific treatment. Apart from some use in animal feeds and aquaculture, poultry and swine wastes are almost entirely managed by land disposal. Contamination of both surface and ground water can result from these practices. Moreover, both holding and land disposal of poultry wastes can attract wild avians because spilled feed is present in these wastes.

In addition, there is growing use of poultry and duck house wastes for use as feed in land-based aquaculture operations. This mode of pathogen transfer is wholly unregulated. Open impoundments for aquaculture are essentially small wetlands, and they are frequently visited by wild avians, setting up another setting for bidirectional pathogen transfers. It should be noted that the fecal-water-oral route is considered a highly probable mode of transmission of avian influenza virus between birds.

Food Animal Wastes and Biosecurity

There is a paucity of research on transfers of viruses from industrial farms; however, there is extensive literature on the exchange of bacteria among confined food animals, wild animals, humans, and the environment. This literature supports concerns about the efficacy of biocontainment at industrial food animal production operations.

Outbreaks

Further evidence of the limits of current bioexclusion measures in large-scale industrial poultry operations is provided by recent HPAI H5N1 outbreaks reported in large-scale industrial poultry units with supposedly high biosecurity standards in South Korea (a 300,000 bird unit), in Russia (two 200,000 bird units), and in Nigeria (a 50,000 bird unit), and in the UK (a 160,000 turkey unit).

Large industrial flocks appear to be overrepresented in the list of HPAI H5N1 outbreaks reported com-
pared to outbreaks in backyard/village flocks, in relation to their respective shares of total national flocks.

Given that a gram of infected feces can contain as many as 10 billion infectious virus particles, a small amount of contaminated fecal material or litter adhering to boots, clothing, or equipment may be sufficient to transmit virus from an infected to a susceptible flock.

**Increased Risks in Confined Poultry Flocks**

The hypothesis that confined poultry operations may present increased risks of HPAI has been tested through an analysis of data on the 2004 HPAI epidemic in Thailand, which also includes a separate dataset from the nationwide active surveillance program undertaken by the Thai government to detect HPAI infections in poultry. These data are unique and highly relevant to addressing questions on biosecurity and biocontainment risks associated with different modes of poultry production.

An analysis of that Thai data (taken from approximately 230,000 flocks in more than 50,000 villages) indicates that the odds of H5N1 outbreaks and infections are significantly higher in large-scale commercial poultry operations as compared with backyard flocks. This data suggests that successful strategies to prevent or mitigate the emergence of pandemic avian influenza must consider risk factors specific to modern industrialized food animal production.

Similarly, data from Canada, although incomplete, have also indicated that in contrast to backyard flocks, large commercial operations were disproportionately affected by a 2004 HPAI outbreak.

**Economics**

As it can be more profitable to raise animals in areas where feed is abundant, e.g., close to feed mills, areas of high poultry density have emerged in a number of regions worldwide. Semi-vertical integration of production processes, where a large company supplies young birds and feed, while farmers provide housing and labor, has often not been accompanied by systematic spatial planning of the units in the system. Although spatial concentration is convenient from an organizational point of view, it has serious drawbacks for the control of epidemic diseases.

Poultry production is also inherently an economic activity, driven by financial incentives and profit motives. These economic forces exist in parallel with the biological pressures that moderate pathogen evolution and spread. Improving the sustainability of current poultry production methods relies on a clear understanding of these economic incentives and their relationship to biological drivers of avian influenza emergence.

**Conclusions**

There have been major changes in many aspects of domestic poultry production in the U.S. and other countries during the 20th century, resulting in industrial-scale operations involving high densities of confined avian populations, which is how most of the world’s animal protein sources are now derived. To date there has been little consideration of industrial poultry production as an ecosystem, in its own right, for understanding emerging infectious disease. These changes in organization, intensity, housing, and waste generation, however, seriously influence the emergence and transfer of diseases among wild and domestic species, and from animals to human populations.

Some of the measures being considered to make the raising of backyard flocks safer, including the forced housing or confinement of poultry, are not likely to result in a major reduction of disease risks. In contrast, the costs will likely be significant and will be imposed upon a marginal group of entrepreneurs and household producers. This may result in an overall reduction of outbreaks as a consequence of the loss of household production flocks, but not as a result of enhanced biosecurity and biocontainment.

This article is based on a World Health Organization fact sheet on avian influenza, a Public Health Reports article “The Animal-Human Interface and Industrial Food Animal Production: Rethinking Biosecurity and Biocontainment”, and an EcoHealth article “Industrial Food Animal Production and Global Health Risks: Exploring the Ecosystems and Economics of Avian Influenza”.

Mortalities resulting from flu outbreaks are disposed of by burning or in mass graves.

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Introduction to Homeopathy

I grew up midway between Wichita and Dodge City, Kansas on a sheep & crop farm with 500 head of Western range ewes. We kids did the majority of sheep chores during the winter lambing months, before school let out and after school was over. After I long day of tail docking and castrations, the flock was rotated through various summer pastures of alfalfa brome and grasses growing along the Pawnee creek, a tributary of the Arkansas River.

I was active in 4-H, which gave me credentials during my high school years, a summary of which was accepted into Kansas State University veterinary school, graduating as a DVM in 1976. I headed East, to NYC and the Animal Medical Center for their internal medicine program, after which I started a small animal hospital in the East Village of Manhattan. I later merged my practice with Dr. C. Schaumburg, who brought his homeopathic library and pharmacy with him, and my initial disbelief turned to acceptance.

But 23 years ago, a simple biopsy changed my life’s direction; I made a complete turnaround when faced with personal health care choices. I sold my practice and moved upstate to mountain country, where wild ginseng still grows. I am now an organic livestock farmer & veterinary homeopath, offering nutritional consulting and cold laser (use of therapeutic non-thermal coherent light stimulation at the cellular level – more widely used in Europe than here) for all species.

I learned very little about sheep & goats when I went to veterinary school. The cost of a vet’s visit would wipe out any profitability, and besides, we were taught “A Sick Sheep is Always a Dead Sheep”. So I was constantly amazed at how effective homeopathic remedies were when treating life-threatening conditions, without using even simple supportive care like heating pads or IV fluids. I later learned that this myth of the acutely dying sheep is due to nature as their prey animal, to hide any signs of disease as a defense mechanism, until they are too sick to care and they are dying.

To work with homeopathy it is important to think in the language of the books you will use for prescribing. Of all the words that can be used to form a Latin term that is the foundation of Western medicine, homeopathy is often the most misunderstood because it approaches disease and healing from a different viewpoint than allopathic medicine. It is an ongoing condition that needs to be treated with a single remedy based on the particular symptoms of the patient’s unique response to disease. Let me repeat this again. It comes down to choosing a single remedy based on the particular symptoms of the sick sheep. This is where homeopathy dramatically differs from Western medicine. Treat each individual differently. Granted, it is hard to decipher these unusual symptoms can narrow down the remedy you choose is in your kit.

When taking a case, first determine whether the illness is a simple acute condition or it is part of an ongoing condition that needs to be treated with a constitutional, chronic or miasmatic remedy. After years of extensive research and analysis, Hahnemann came to the understanding that disease was caused by some inherited tendency to be susceptible to certain diseases, which he called Miasm, from the Greek word for defilement or pollution. When it is caused by some inherited tendency to be susceptible to certain diseases, which he called Miasm, from the Greek word for defilement or pollution. When it comes to chronic disease (like rot or growing old), constitutional treatment is necessary. When it comes to chronic conditions in sheep because of the time consuming effort and expense of treatment,宪, and not just “(proven)” in healthy subjects before being included in the Materia Medica, our dictionary of toxicology and remedy descriptions.

Homeopathy’s therapeutic effects are currently being studied in the context of high dilutional physics, nano particles, and the principle of Homeothesis which is a dose-responsive phenomenon in which a low dose of a substance stimulates a high dose inhibits. For example, the effect of hormone is best observed in Oxytocin, the major component of Roundup, in its endocrine disrupting actions even with exposure in trace amounts. (For more on glyphosate and its endocrine disrupting modes of action: https://people.csail.mit.edu/seneff/2016/SeneffSanDiego.pptx).

So back to the practice of homeopathy: a single remedy is chosen based on the totality of symptoms.

Symptoms expressed individually by the patient are most important in homeopathic treatment, as they indicate each case as an unique response to disease. In fact, it is not necessary to know the name of the disease or spend lots of $$ on tests first to get a diagnosis, in order to treat with homeopathy. Let me repeat this again. It comes down to choosing a single remedy based on the particular symptoms of the sick sheep. This is where homeopathy dramatically differs from Western medicine. Treat each individual differently. Granted, it is hard to decipher the symptoms of a sick sheep when they tend to just fade away – more and more likely the art of Homeopathy. So let me explain some of the basic principles of the natural farmer.

Homeopathic Simplified, for the Shepherd

by Mary Ellen Finger, DVM

Of all the different kinds of alternative medicine, homeopathy is often the most misunderstood and remedy descriptions. Of all the different kinds of alternative medicine, homeopathy is often the most misunderstood and remedy descriptions. Of all the different kinds of alternative medicine, homeopathy is often the most misunderstood and remedy descriptions. Of all the different kinds of alternative medicine, homeopathy is often the most misunderstood and remedy descriptions. Of all the different kinds of alternative medicine, homeopathy is often the most misunderstood and remedy descriptions. Of all the different kinds of alternative medicine, homeopathy is often the most misunderstood and remedy descriptions.

**How to Prescribe a Remedy**

- **Intake - Observation and Timeline of the Disease.** Observe the animal and find out what has happened to it in the past
- **Unique Symptoms - Keynotes; Strange, Rare and Peculiar; Mental/Emotional; and Never Well Since (discussed below.)**
- **Match sheep’s Symptom picture to a Remedy picture (read Materia Medica and make sure the remedy you choose is in your kit)**

**Keynotes**

A keynote of a remedy is a symptom that is typical of it, so much so that it makes the experienced homeopath think of that remedy. Depending on how exceptional and rare it is, a keynote may become #1 on your list of symptoms. An example of a physical keynote for the remedy Gelsemium would be droopy eyelids, being so tired or weak that the animal can hardly keep them open. Emergencies leave little time for detailed histories, so I use Constantine Hering’s “three-legged stool” method for keynote prescribing. I find 3 strong symptoms that have changed with the onset of the illness and which are often “keynotes.”

**Strange, Rare and Peculiar Symptoms**

These unusual symptoms can narrow down the remedy choice to a smaller, more manageable number of choices. The symptom must be peculiar to the patient rather than common to the disease. The more common symptoms (lack of appetite, fatigue, discomfort, etc.) are to be seen with almost every disease, and thus deserve little attention. An example of a SRP symptom would be an animal running a fever yet having no thirst for water. This is unusual. The rubric (a rubric is the essence of a symptom stated in a few words and listed in the homeopathic Repertory) for this in the Foot chapter is, thirstless during fever.

**The Never Well Since (NWS) or Aliments From (AF)**

This is the second most important group of symptoms, which answer “Why did the patient get sick in the first place?” I have listed some examples of...
biochemical system of medicine. I have applied this theory of using a mineral in homeopathic potency to treat a deficiency condition using a 6X of Selenium for White Muscle Disease. Of course, it requires some nutritional assistance in addition, including sources of Selenium like Kelp, Diamond V yeast and a sheep mineral mix, as well as making sure your pastures are properly mineralized with Sulfur.

Two other cell salts commonly used in a livestock operation would be Calc phos for delayed development, imperforate prostate, and a pertussis vaccination. Especially for young, rapidly growing animals, and with various complaints, when there has been a history of traumatic birth, and when indicated remedies fail to act.

Mental and Emotional Factors

Typical mental or emotional symptoms in acute ailments in animals include:

- Restlessness and fearfulness
- Acrania and Arsenicum

Sudden onset of any symptom from shock or fright - Acmia

- Extreme clingingness, wanting to climb on owner's lap - Pulsatilla

Wanting to be left alone, with grouchiness - Bryonia

Wanting to be left alone, aversion to touch, after injury - Arnica

- Cynophobia and contrariety, nothing satisfies - Chamomilla

Grief leading to profound indiffidence - Phosphoric acid

In these examples, the remedy should be confirmed with the rest of the case. But the chosen remedy must bear similarity to the mental/emotional state as this can be a causative factor.

Let me also include a few variations in methods of prescribing:

Therapeutic or Clinical Prescribing

This method is useful in any situation where the diagnosis is easily determined, and it is primarily the disease that is to be treated. It is very effective for saving time and is especially suited to the treatment of acute diseases and 1st Aid situations. I have found this to be the method I use most often when I'm faced with a dying sheep.

Here the emphasis is on treating the disease process rather than addressing the individual, but using the characteristic disease symptoms exhibited by the patient to repertorize (to find a rubric in the Repertory that matches the symptoms and then select the appropriate remedy known as the homoeopathic perspective). This requires a return to the books to see if the patient is close to death or suffering a severe injury, and less frequently (once a day or even only 1 - 2 times per week) if the condition has come on slowly over several days or weeks. When improvement is seen, stop dosing and wait for the improvement to plateau before repeating another dose of the remedy. Often times only one dose is needed for the animal to recover. If no improvement is seen after 2 - 3 doses and watching and waiting a length of time depending on the severity of the condition, then try another remedy that was indicated. Sometimes there will be some improvement and new symptoms will also appear. This requires a return to the books to select another remedy that is indicated by the new symptoms. I therefore recommend keeping a copy of the Encyclopedia of Remedy Relationships in Homeopathy.

Epidemic or Clinical Prescribing

Homeopathy has been very successful in epidemic prescribing. Hahnemann's success in treating the great epidemics of his era established his reputation as a great healer. He saved Napoleon's army from typhus fever with the two remedies Bryonia and Rhuss tox. He cured the cholera that was ravaging Europe in 1821. For the veterinary homeopath, prescribing is simple. The symptoms common to all the animals in the herd/flock. These are the cardinal symptoms of the epidemic, the basis for selecting the main remedy. This is the genus epidemicus, the remedy that will treat the rest of the flock as a prevention. (ie. Acmia for shipping fever)

Nosodes

Occasionally, I will use a nosode, a product of disease or diseased tissues. In my veterinary work, I have successfully used (Patuxent, Bryonia, Lyme disease) and Pyrogen (rotten meat) nosodes. These are acquired miacids, which can occur in one of several ways: after an acute disease such as the flu or a virus vaccine (Influenzum), or with Rabies, from the vaccine or bite of an angry dog (Lyssin). I have frequently seen many cases of chronic disease following Rabies vaccination (feline OCD neurode-

mata), or with Rabies, from the vaccine or bite of an angry dog (Lyssin). I have frequently seen many cases of chronic disease following Rabies vaccination (feline OCD neurode-

mata), or with Rabies, from the vaccine or bite of an angry dog (Lyssin).

Homeopathic treatment of chronic conditions should be overseen by a veterinarian with advanced training.

Any remedy if used when not truly indicated has potential to cause harm. So unless you are fairly certain of the indicated remedy, the lower potencies should be used when starting treatment. And there are some remedies that should not be used in the early stages of a disease; such asemic or atonic. Such contra-indicated remedies can be both complementary as well as antidote. Such drugs are capable of both antidoting or correcting the undesired effects and maintaining the beneficial action of the previously given remedy.

The remedies that follow well are useful for selecting or completing the list for second prescription.

In general:

1.) Do not open any remedy bottle in a room where strong odors are present (menthol, tiger balm, Es- war)

2.) Do not touch the pellets.

3.) Do not expose the remedies or dosing bottle to sunlight or extreme heat.

4.) Do not reuse the dosing bottle for another remedy.

5.) Do not store remedies on/near TV, microwave, computer, or near heat.

6.) Do not give remedy dose with food.

From the Encyclopedia of Remedy Relationships in Homeopathy by Abdur Rehman:

- A complementary remedy is one that continues or completes the action of the drug that has acted previously. It is generally given at the same time or at the same or close to death or suffering a severe injury, and less frequently (once a day or even only 1 - 2 times per week) if the condition has come on slowly over several days or weeks. When improvement is seen, stop dosing and wait for the improvement to plateau before repeating another dose of the remedy. Often times only one dose is needed for the animal to recover. If no improvement is seen after 2 - 3 doses and watching and waiting a length of time depending on the severity of the condition, then try another remedy that was indicated. Sometimes there will be some improvement and new symptoms will also appear. This requires a return to the books to select another remedy that is indicated by the new symptoms. I therefore recommend keeping a copy of the Encyclopedia of Remedy Relationships in Homeopathy.

- The remedies that follow well are useful for selecting one among the list for second prescription.

- An inimical drug does not follow or precede well the previously given drug. AVOID

- The antidotal remedy is a curative antidote if one needs to antidote the over action of the previously given similar. The same remedy can be both complementary as well as antidote. Such drugs are capable of both antidoting or correcting the undesired effects and maintaining the beneficial action of the previously given remedy, it can be both a complementary and an antidote.

- The collateral remedy is one that runs parallel to the remedy given previously. One among the list can be selected as an alternative drug.

The following list of remedies includes only my commonly used remedies in midwifery.
The first remedies listed are Complementary, then FWB, Antidotes, Inimical or Collateral.

**Aconite** - Arn, Bell, Bry, Puls, Sulph; **FWB**: Arn, Ars, Bell, Bry, Calc, Chin, Gels, Hep, Hyper, Ledum, Nux, Phos, Puls, Sep, Sil, Sylph

**Arnica** - Acon, Bellis, Calc, Hep, Hyper, Ledum, Nat-s, Rhus, Sulph, Verat; **FWB**: Ars, Bell, Bry, Calen, Chin, Ham, Hell, Nux, Phos, Puls, Ruta, Symph

**Belladonna** - Calc, Hep, Lach, Lyc, Pyrog, Rhus, Sulph; **FWB**: Acon, Arn, Ars, Bry, Calc, Cham, Chin, Hep, Lach, Lyc, Nux, Phos, Puls, Pyrog, Rhus, Sep, Sil, Sulph; **Antidotes**: Acon, Chin, Hep, Lach, Nux, Puls, Rhus

**Calc phos** - Calc, Cham, Chin, Hep, Mag-c/p, Nat-m, Ruta, Sil, Sulph; **FWB**: Ars, Chin, Ferr-p, Mag-c/p, Nat-m, Phos, Rhus, Sil, Sulph; **Antidotes**: Calc; **Inimical**: Bar-c

**Carbo veg** - Ant-t, Arn, Ars, Calc-p, Chin, Lach, Phos, Sec, Sel; **FWB**: Acon, Ant-t, Ars, Chin, Lach, Lyc, Nux, Phos, Puls, Sep, Sil, Sulph; **Antidote**: Ars, Chin, Lach

**Caulophyllum** - FWB: Bell, Cimic, Gels, Nux, Puls, Sep; Calc as intercurrent

**Cimicifuga** - FWB: Bell, Hep, Puls, Sep; **Collateral**: Caul, Gels

**Gelsemium** - Sep; **FWB**: Ars, Caul, Nux, Puls

**Ledum** - Chin, Sep, Sulph; **FWB**: Acon, Bell, Bry, Calc, Hyper, Lyc, Nux, Puls, Sulph

**Hypericum** - Arn, Calen; **FWB**: Acon, Bellis, Bry, Hell, Rhus

**Pulsatilla** - Lyc, Sep, Sil, Sulph; **FWB**: Calc carb, Nux (intercurrent), Sep, Sil, Sulph;

**Sepia** - Calc, Gels, Nux, Phos, Puls, Rhus, Sil, Sulph; **FWB**: Calc, Lyc, Nux, Rhus, Sil, Sulph; **Antidotes**: Calc, Chin, Phos, Rhus, Sulph; **Inimical**: Lach, Puls (never alternate with)

**Silica** - Ars, Calc-c/p, Cham, Hep, Lyc, Phos, Puls, Sulph, Thuja; **FWB**: Bell, Calc-c/p, Hep, Lach, Lyc, Nux, Phos, Puls, Pyrog, Rhus, Sep, Sulph, Thuja; **Antidotes**: Hep, Sulph

**Nosodes**

**Pyrogen** - Ars, Bell, Bry, Hep, Lach, Sil, Thuja; **FWB**: Hep, Mag-c, Sulph

**Lyssin** - Staph; **FWB**: Gels, Lach, Led, Nat-c/m, Stram, Puls; **Antidotes**: Bell, Lach, Stram
Hammamelis – flow can be dark, steady, slow and passive or active, red and profuse. A keynote is “hemorrhages with tranquil mind;” no anxiety or alarm exhibited; no uterine pains.

Sabina – prolonged bleeding (days and weeks) of bright red blood and dark clots, esp. when associated with retention of placenta or miscarriage.

Phosphorus – used at first sign often acts preventative to stop bleeding; anxious, restless, afraid to be alone. Extreme thirst.

China – for the ewe exhausted from labor with an excessive loss of blood, leaving her weak, faint, shivering.

Infection

Arnica and Calendula for prophylaxis

Hepar sulph – inflammation, aecess, pus. Very sensitive to touch.

Pyrogen – often resulting from retained placenta, foul smelling discharge. Often a single dose of 200c or 1M will stop the development of sepsis.

Belladonna – sudden onset with high fever, delirious and very sensitive to least jarring movement.

Arsenicum – weak and prostrate but restless and agitated, frequent sips of water. Serious septic cases such as endotoxic shock.

Matstis

Apis – swelling with udder edema. Worse heat, better cold.

Bellas – hot, tense, swollen. Sudden onset, delirious.

Lachesis – septic mastitis or metritis with dark blood and purplish tissues.

Physiostigmus – chronic, hard and painful with lumpy knots or nodules.


Silica – cracks in nipples; chronic, hard swellings or purplish tissues.

Very painful udder, irritable ewe.

Abundant milk often has a bad odor. A keynote is fever, sensitivity to cold, restless delirious. Blood and purplish tissues.

Lachesis – septic mastitis or metritis with dark blood and purplish tissues.


Silica – cracks in nipples; chronic, hard swellings or purplish tissues.

Secale – septic placenta; continuous severe bearing down; panting; weak pulse.

Ipecac – bright red, profuse bleeding. The mother and lamb are both quiet, often with approximately 2-4 ounces of colostrum.

Pulsatilla – absence of contractions. Labor is slow, passive, trickling flow. Most useful at the beginning to produce nice contractions. Follow with Cimicifuga once contractions are established. Be careful with frequent repetitions of high potencies. I caused a vaginal prolapse when given prematurely and in excess.

Gelsemium – extreme weakness, dull, drowsy, sleepy. Use when Cautophyllum doesn’t work.

Arnica – traumatic labor due to large lamb; prolonged and difficult labor. Give for several days after to heal pelvic tissues and prevent post partum problems.

Sepia – older ewes worn out from too many lambs who should have an easier delivery. Tendency to produce milk. Will have a strong bearing down sensation. This remedy will also help a ewe who is so exhausted from delivering the lamb that there is no energy for contractions to expel the placenta, or who acts indifferent or rejects the newborn lamb.

Post Partum Complications – Retained Placenta

In addition to the above remedies, Belladonna – bright red gushing blood between after pangs with concurrent delicious mental state. Blood flow has often a bad odor. Keynote: fever; sensitivity to cold, restless delirious. Blood and purplish tissues.

Ipecac – bright red, profuse bleeding. The mother and lamb are both quiet, often with approximately 2-4 ounces of colostrum.

Do not remove the lamb from the mother for any reason.

Pulsatilla – first remedy to consider in increasing, intestinal, colicky periods. A keynote is absent of contractions. Labor is slow, passive, trickling flow. Most useful at the beginning to produce nice contractions. Follow with Cimicifuga once contractions are established. Be careful with frequent repetitions of high potencies. I caused a vaginal prolapse when given prematurely and in excess.

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The Natural Farmer

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Homeopathic References and Supplies

by Mary Ellen Finger, DMV

Dr. Robin Murphy, ND, Homeopathic Medical Repertory
Nature’s Materia Medica: 1,400 Homeopathic and Herbal Remedies
(For 100 years since James Kent, and his 3rd edition is now titled Homeopathic Clinical Repertory: A Modern Alphabetic and Practical Repertory. It is the most user friendly repertory I have ever used, with a word index not found in any other textbook, and a chapter format geared to the modern age. Same praise for his Materia Medica.)

Dr. Luc De Schepper, MD, PhD, CHom, D.I.Hom, Lic.Ac., Hahnemann Revisited: A Textbook of Classical Homeopathy for the Professional
(For Luc has been my most inspiring teacher, and his books match his speaking style and ability to translate complex theories into easily understood concepts. As a practicing clinician, he brings years of practical experience to his readers.)

Dr. Roger Morrison, MD, Desktop Guide to Keynotes and Confirmatory Symptoms, Desktop Companion to Physical Pathology

Sandra J. Perko, PhD, Homeopathy for the Modern Pregnant Woman and her Infant
(This is the best midwifery book I have found, indispensable for a lambing operation)

Dr. Edgar Sheaffer, VMD, Homeopathy for the Herd: A Farmer’s Guide to Low Cost, Non-Toxic Veterinary Care of Cattle
(For Dr. Sheaffer works with the Amish and Mennonite farming communities in central Pennsylvania.)

Dr. Hubert Karreman, VMD, Treating Dairy Cows Naturally: Thoughts and Strategies

Dana Ullman, MPH, Homeopathic Medicine for Infants and Children
(My very first homeopathic reference book. This inexpensive paperback edition is useful when working with any nonverbal patients)

David Henderson, The Veterinary Book for Sheep Farmers

Homeopathic References and Supplies

(Their Top 100 Remedy Kit has all the necessary midwife remedies, including the nosode Pyroge-num, which has saved many a ewe with septicemia, from retained placentas to gangrenous mastitis. It is essential to have remedies on hand, as there is a very narrow time frame for treating sheep. They most often die within 12-24 hours after first showing symptoms, leaving no time to go shopping at the local health food store for remedies.)

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Factory Farms and Animal Health

by Jack Kittredge

Livestock farming has undergone a significant transformation in the past few decades. Most meat and dairy products now are produced on large farms with single species buildings or open-air pens. Breeding programs have focused on production, getting more food produced in less time and for less cost per unit. Since 1960 milk production has more than doubled, meat production has more than tripled, and egg production has more than quadrupled. It now takes far less time to raise fully grown animals. In 1920, for instance, a chicken took approximately 16 weeks to reach a little over 2 pounds. Now they can reach 5 pounds in 7 weeks! These new technologies have allowed farmers to continually reduce per unit costs, which means bigger profits on less land and capital, which results in further incentive to increase farm size.

“Factory farms”, those that use these confinement approaches and scale up, are often criticized for the smell and water pollution caused by the resulting volume of manure; the unhealthy, grain-heavy diets of farm animals consume there; and the stressful, crowded conditions in which the animals live.

Johns Hopkins researchers Ellen Silbergeld, Jay Graham, and Lance Price write: “Concentrated animal feeding operations (CAFOs) are comparable to poorly run hospitals, where everyone is given antibiotics, patients lie in unchanged beds, hygiene is nonexistent, infections and re-infections are rife, waste is thrown out the window, and visitors enter and leave at will.”

By concentrating large numbers of animals together, factory farms are powerful incubators for disease. The stress of life under factory farm conditions weakens an animal’s immune system: ammonia from accumulated waste burns the lungs and makes them more susceptible to infection; the lack of sunlight and fresh air — as well as the identical genetics of industrial farm animal populations — facilitates the spread of pathogens.

These virulent diseases can then spread to the wider community via many routes — not just in food, but also in water, the air, and the bodies of farmers, farm workers, and their families. Once those microbes become widespread in the environment, it’s very difficult to get rid of them. In addition, evidence is emerging of surprisingly high rates of mutation in those disease organisms found in our farm animals.

What are some of the major features of factory farms that make them incubators for disease?

Manure

One of the most pressing public health issues associated with factory farms stems from the amount of manure they produce. Large farms can produce more waste than some U.S. cities — a feeding operation with 800,000 pigs can produce over 1.6 million tons of waste a year. That amount is one and a half times more than the annual sanitary waste produced by the city of Philadelphia, Pennsylvania.

It is estimated that livestock animals in the U.S. each year produce as much as 1.2-1.4 billion tons of waste — which is several times more manure than is produced by all the people in the U.S. And remember, though sewage treatment plants are required for human waste, no such treatment facility exists for livestock waste.

While manure is valuable to the farming industry, in large quantities it becomes problematic. Many farms no longer grow their own feed, so they cannot use the manure they produce for fertility. Concentrated operations, especially, must find a way to manage the large quantities of manure produced by their animals. Ground application of untreated manure is one of the most common disposal methods due to its low cost. It has limitations, however, such as the inability to apply manure while the ground is frozen. There are also limits as to how many nutrients from manure a land area can handle.

When manure is applied too frequently or in too large a quantity to an area, nutrients overwhelm the absorptive capacity of the soil, and either run off or are leached into the groundwater. Storage units can break or become faulty, and rainfall can cause holding lagoons to overflow. While confinement operations are required to have permits that limit the levels of manure discharge, handling large amounts of manure inevitably causes accidental releases that impact humans.

Manure also contains a variety of potential contaminants. It can contain plant nutrients such as nitrogen and phosphorus, pathogens, growth hormones, antibiotics, animal blood, silage leachate from corn feed, copper sulfate used in footbaths for cows, and chemicals used as additives to minimize the offensive smell or other aspects of the manure.

Emissions from degrading manure and livestock digestive processes also produce air pollutants that often affect ambient air quality in communities surrounding CAFOs. Greenhouse gases, which contribute to global climate change, are also emitted by confinement operations.

Antibiotics

In the 1950s, American scientists found that adding antibiotics to animal feed increases the growth rate of livestock. Research on this was published and the practice expanded until, in 2001, the Union of Concerned Scientists found that nearly 90% of the total use of antimicrobials in the United States was for non-therapeutic purposes in agricultural production.

Antibiotic-resistant microbes, as well as the antibiotics themselves, are now widely present as environmental contaminants, with unknown consequences for everything from soil microorganisms to people. The U.S. Geological Survey found antimicrobial residues in 48 percent of 139 streams tested nationwide from 1999 to 2000. Other studies have detected resistant bacteria in the air up to 30 meters upwind and 150 meters downwind of industrial hog facilities.

This widespread misuse of antibiotics as feed additives in industrial livestock operations has led, of course, to reduced efficacy of antibiotics in human medicine — a trend that is worrying many medical professionals. The World Health Organization, American Public Health Association, American Medical Association, American Academy of Pediatrics and numerous other public health organizations have called for greater regulation of antibiotic use in livestock.

Illusory Biosecurity

Biosecurity is broadly defined as any practice or system that prevents the spread of infectious agents from infected to susceptible animals. As poultry and swine production has changed from small-scale methods to industrial-scale operations, there is substantial evidence of pathogen movement between and among these industrial facilities, release to the external environment, and exposure to farm workers, which challenges the assumption that modern poultry production is more biosecure and biocontained as compared with backyard or smallholder

An aerial shot of hog farms and lagoons near a creek in North Carolina
operations in preventing introduction and release of pathogens. Because of the economics of factory farming today, the design and operational requirements of large-scale poultry and swine houses in and of themselves result in compromises of biosecurity. The confinement of animals and their wastes controls to reduce heat and regulate humidity. Poultry and swine houses are ventilated with high-volume fans that result in considerable bidirectional movement of particles, dust, and bacteria between the animal house and the external environment. In addition, one study found that as many as 30,000 flies may enter a broiler house during a single flock rotation in the summer months, suggesting that the impact of insect vectors may also be significant.

Workers in CAFOs and members of nearby communities are also at potential risk of exposure to pathogens. Studies of airborne concentrations of bacterial pathogens at CAFOs have found that bacteria were recovered inside and downwind of the facilities as soft cheeses and meat pates. Listeria continues to be a major foodborne pathogen. One way in which Salmonella infection can be introduced and spread is via contaminated raw cookie dough and in 1983, it was found that it is no longer killed off in antibiotic-resistant Salmonella is on the rise: One study found that as many as 30,000 samples taken from more than 5,000 operations across two dozen countries) cage-free barns had about 40% lower odds of harboring the egg-related strain of Salmonella. Listeria, Listeria, yet another bacterial infection, can cause miscarriages, stillbirths, and serious illnesses in newborns. It is particularly a modern problem as Listeria has been found to be able to survive in refrigerated food. Between 1987 and 1989, 26 babies in the UK died from listeriosis. In response, in 1989 the UK Government issued a warning to vulnerable groups, such as pregnant women, to avoid high-risk foods, such as soft cheeses and cold cuts. The bacteria can be found in the feces of many animals, in particular, Listeria has been found to be able to survive in refrigerated food. Between 1987 and 1989, 26 babies in the UK died from listeriosis. In response, in 1989 the UK Government issued a warning to vulnerable groups, such as pregnant women, to avoid high-risk foods, such as soft cheeses and cold cuts. The bacteria can be found in the feces of many animals. 1.4 million U.S. cases each year, including 18,000 hospitalizations and 600 deaths. Salmonella can contaminate beef, poultry, eggs and even vegetables. Antibiotic-resistant Salmonella is on the rise: One study found that as many as 50,000 flies may enter a broiler house during a single flock rotation in the summer months, suggesting that the impact of insect vectors may also be significant.

As the human population increases, and mega cities grow, there is greater risk that infectious diseases will evolve, emerge, or spread readily among the populace. The concentration of animals may augment the risk of zoonoses, diseases transmissible from animals to humans. All segments of livestock production contribute to zoonotic disease, including transportation of livestock, management practices, veterinary medicine, meat processing and animal rendering. Ideally, everyone involved in these components of the industry should be cognizant of the infectious disease risks to animals and humans alike, and take precautions. In reality, the economics of factory farming do not currently repay strong efforts to protect workers, neighbors, or the environment.

Strep

Streptococcus is a family of bacteria responsible for many animal and human infections. Many species of Streptococcus can be isolated from normal swine. There is no, single, consistent predictor of possible pathogenicity, although environmental or other predisposing factors may influence it. Outbreaks of streptococcal disease in swine have occurred for many years before the organism, S. suis, was identified in 1987 as a new pathogenic species. Outbreaks of S. suis infection now are reported frequently.

S. suis survives in dust and feces in the usual swine environment. It is present in the feces and nasal secretions of carriers. Transmission may be through inhalation, ingestion or nose-to-nose contact. Flies and rodents may play a role in mechanical spread. In 2005 the world’s largest and deadliest outbreak of the pathogen Strep. Suis emerged, causing meningitis and death in people handling infected pork products. Experts blamed the emergence on factory farming practices. Pig factories in Malaysia birthed the Nipah virus, one of the deadliest of human pathogens, a contagious respiratory disease causing respiratory failure and bacterial infection of people infected. Its emergence was likewise blamed squarely on factory farming.

E. Coli

The bacterium Escherichia coli is a normal inhabitant of the gastrointestinal tract of humans and livestock. It colonizes the newborn’s colon within hours of birth, and serves important intestinal physiological functions for the rest of the host’s life.

The content of one’s food, however, can seriously change what goes on in one’s intestines. Traditionally, one’s digestive tract was a relatively sterile environment. After the last couple of generations government corn subsidies and consumer demand for more fatty, marbled beef has motivated farmers to switch to higher grain-based feed for their cattle. This means that the digestive systems became more acidic in order to tolerate the grain.

In the Omnivore’s Dilemma Michael Pollan explains what happened next: “Most of the microbes that reside in the gut of a cow and find their way into our food get killed off by the strong acids in our stomachs, since they evolved to live in the neutral pH environment of the rumen. But the rumen of a cow is buffered for its own stomachs, and in this new, man-made environment new acid resistant strains of E. coli, of which O157:H7 is one, have evolved.”

This strain has received close attention because, in 1983, it was found that it is no longer killed off in humans’ acidic stomachs and can lead to haemolytic uraemic syndrome (HUS), a form of kidney failure. This is fatal in 10 percent of cases, and those who recover may have serious long-term impairment of kidney function. Without treatment the US does not develop. E. coli O157:H7 commonly results in severe abdominal cramps, bloody diarrhea, and in some cases vomiting. The infectious dose appears to be very small - ingestion of less than 100 bacteria can produce illness. No specific treatment exists, and the effectiveness of antibiotics remains unclear.

The toxic strains are linked to conditions in beef feedlots, with ground beef is the most common contamination source. The massive volume of contaminated feedlot, with ground beef is the most common contamination source.

Prions have been measured in air up to 30 meters downwind of broiler facilities housing colonized flocks. Poultry are not the only potential source of Campylobacter, however. In Holland, 85 per cent of pigs sampled were found to be infected with Campylobacter.

Salmonella

This is another bacteria causing frequent and sometimes serious foodborne illness, with an estimated 1.4 million U.S. cases each year, including 18,000 hospitalizations and 600 deaths. Salmonella can contaminate beef, poultry, eggs and even vegetables. Antibiotic-resistant Salmonella is on the rise: One study found that as many as 50,000 flies may enter a broiler house during a single flock rotation in the summer months, suggesting that the impact of insect vectors may also be significant.

Before the industrialization of egg production, Salmonella only sickened a few hundred Americans every year and Salmonella Enteritidis was not found in eggs at all. It was a time when our grandparents could drink eggnog and children could eat raw cookie dough without fear of joining the thousands of Americans hospitalized with Salmonella infections every year. By the beginning of the 21st century, however, Salmonella Enteritidis-contaminated eggs were sickening an estimated 182,000 Americans annually.

How is it that Salmonella infection of farm animals is so common, and how is it spread? One way in which Salmonella infection can be introduced and spread is via contaminated raw cookie dough. An egg is specific to conditions in factory farms.

According to scientists at the Central Veterinary Laboratory in the United Kingdom: "Bacterial infections can be spread by the airborne route in farm animals, particularly when reared intensively. For example, poor ventilation in poultry houses can cause high concentrations of ammonia to develop and irritate the respiratory tract, predisposing to infection."

Salmonella-contaminated battery cage operations in the United States confine an average of more than 100,000 hens in a single shed. As one might expect, such environments can also be significantly contaminated. The massive volume of contaminated airborne fecal dust in such a facility rapidly accelerates the spread of infection. Analysis of litter and dust samples from commercial turkeys, for example, found Salmonella at 86 per cent of flocks.

In the largest study of its kind (analyzing more than 30,000 samples taken from more than 5,000 operations across two dozen countries) cage-free barns had about 40% lower odds of harboring the egg-related strain of Salmonella.

Listeria

Listeria, yet another bacterial infection, can cause miscarriages, stillbirths, and serious illnesses in newborns. It is particularly a modern problem as Listeria has been found to be able to survive in refrigerated food. Between 1987 and 1989, 26 babies in the UK died from listeriosis. In response, in 1989 the UK Government issued a warning to vulnerable groups, such as pregnant women, to avoid high-risk foods, such as soft cheeses and cold cuts. The bacteria can be found in the feces of many animals, in particular, Listeria has been found to be able to survive in refrigerated food. Between 1987 and 1989, 26 babies in the UK died from listeriosis. In response, in 1989 the UK Government issued a warning to vulnerable groups, such as pregnant women, to avoid high-risk foods, such as soft cheeses and cold cuts. The bacteria can be found in the feces of many animals.

In the US, multistate outbreaks have occurred in each of the last six years, including a four-state, 3-death one associated with dairy products in the southeast in 2012. A rare listeria outbreak even turned associated with dairy products in 2014, and a well-known 2011 Colorado-sourced outbreak involving cantaloupes which infected 147 and killed 33 consumers.

Enterococcus

Enterococci are a widespread group of intestinal bacteria that can cause serious infections in other parts of the body. Antibiotic resistance is a major concern with Enterococcus faecium, the strain most commonly associated with illness in people. Accumulating evidence now indicates that the use of the antibiotic vancomycin in humans is associated with the emergence of Enterococcus faecium which contains the gene vanA which codes for resistance to the antibiotic vancomycin.

A 2011 study shows that house flies and German cockroaches in the same environment likely serve as vectors and/or reservoirs of antibiotic-resistant and potentially virulent enterococci and consequently may play an important role in animal and public health.

Strep

Streptococcus is a family of bacteria responsible for many animal and human infections. Many species of Streptococcus can be isolated from normal swine. There is no, single, consistent predictor of possible pathogenicity, although environmental or other predisposing factors may influence it. Outbreaks of streptococcal disease in swine have occurred for many years before the organism, S. suis, was identified in 1987 as a new pathogenic species. Outbreaks of S. suis infection now are reported frequently.

S. suis survives in dust and feces in the usual swine environment. It is present in the feces and nasal secretions of carriers. Transmission may be through inhalation, ingestion or nose-to-nose contact. Flies and rodents may play a role in mechanical spread. In 2005 the world’s largest and deadliest outbreak of the pathogen Strep. Suis emerged, causing meningitis and death in people handling infected pork products. Experts blamed the emergence on factory farming practices. Pig factories in Malaysia birthed the Nipah virus, one of the deadliest of human pathogens, a contagious respiratory disease causing respiratory failure and bacterial infection of people infected. Its emergence was likewise blamed squarely on factory farming.
The term “self-medication” comes from human medicine. It is defined as “The consumption of a substance, without physician input, to compensate for any medical or psychological condition.”

Parasitism is one of the greatest disease problems in grazing livestock. Controlling parasites with drugs is challenging, particularly in recent times due to the rise in drug-resistant internal parasites. Evidence suggests that parasitized animals in the wild use natural plant secondary compounds as anti-parasitic agents. Can parasitized domestic sheep and goats also learn to use such compounds? If the answer is yes, they could learn to self-medicate with them and eat plant secondary compound-rich vegetation, either on rangeland or pasture, when needed, while having other nutritious and safe forages available to meet their nutritional requirements.

Wild animals apparently use medicinal herbs to treat illness. Unfortunately, the information available on self-medicating behavior in wild species is often anecdotal. Controlled experiments in the wild may be constrained by animal welfare and preservation policies.

Based on his studies on primates, Michael A. Huff defined a set of conditions to separate self-medication from normal feeding in the wild: (1) the animal should show signs of illness; (2) it should seek a substance that is not part of its normal diet and has no nutritional value; (3) the animal's health should improve; (4) laboratory analysis of the substance should establish that enough active ingredients have been ingested to bring about the changes observed.

Effects of Parasitism

The first step of establishing self-medication should be that an animal shows signs of illness. Parasitism results in obvious signs of disease such as diarrhea, high body temperature, passivity, etc. Subclinical parasitism can also challenge the infected animal by reducing production, even when no signs of the infections are observed.

The most significant effect of gastrointestinal parasites is that they consume a host's nutritional resources, causing increased plasma metabolites. Worms cause damage to the lining of the gastrointestinal tract, which causes increased plasma metabolites. Impaired protein metabolism suggests herbivores sense their parasitic burdens.

Infusions of casein (milk protein) into the stomach improves the rate of protein retention of parasitized animals. Lambs infected with larvae of Trichostrongylus colubriformis and given a choice between two foods with different protein contents increase intake of protein-rich foods, which may help counter the loss of protein due to parasitism. Parasitized animals grazing a mixed grass-clover pasture increase the rate of protein retention of parasitized animals, which in turn negatively impact cells and their functions.

Anorexia

Anorexia is the most significant effect of gastrointestinal parasites on herbivores. Some research indicates that anorexia may result from changes in the diet. Anorexia may result from pain and discomfort caused by parasites or a consequence of hormonal changes due to disruption in the gastrointestinal tract. Thus, anorexia is one of the first signs suggesting herbivores sense their parasitic burdens.

Impaired protein metabolism

Gastrointestinal parasites reduce the host's ability to retain protein. Some evidence suggests that parasites sense their parasitic burdens. Leaf swallowing behavior is one example. Leaf swallowing behavior may be learned on its own – sensing the benefits of eating bitter leaves for both nutritional and medicinal properties. In fact, local goat breeders tether their kids to avoid intake of tannin-rich leaves. Mamber goats and barbary sheep experience anorexia when their offspring are parasitized.

Toxins

Toxins produced by internal parasites may also help the animal sense parasitism. For instance, parasite-derived molecules can activate some cytokines, which in turn negatively impact cells and their metabolism in the host animal.
Other plants selected by chimpanzees have medicinal effects to combat internal parasite at the doses commonly consumed:
1. Limonoids in *Trichilia rubescens* have anthelmintic activity;
2. Thianbinones in *Aspilia* species have anti-parasitic and antibiotic properties;
3. Methoxypsoralen in *Ficus exasperata* is a strong antibiotic.

Some medicines found in nature for various parasites

Gastro-intestinal parasites
Considerable attention has been given recently to the anthelmintic (deworming) properties of plant secondary compounds such as tannins, alkaloids and terpenes in plants consumed by livestock.

Livestock feeding on tannin-containing herbaceous species such as senna, saffron, and *Sericea lespedeza* or browse, such as heather, a number of acacia species, and lentisk, have lower fecal egg counts than those eating plants of similar quality, or the same rations without tannins. Tannins impair larval establishment and decreases reproduction of internal parasites.

Substituting concentrates with cassava hay – containing 13% hydrogen cyanide – resulted in impressive reduction of *Eimeria* oocysts excretion in Vietnamese goats. *Coccidiosis* is also alleviated in goats when they eat the fruits of *Melia azedarach* that contain both tannins and limonoids.

External parasites
Neem extract reduces feeding activity of the tick larvae and reduces molting by 60%. When lambs infected with ticks eat azadirachtin, a neem limonoid, in sufficient amounts, it reaches the peripheral blood, decreasing blood feeding by ticks, and often kills egg-laying ticks after detachment.

Blood parasites
Alcohol extracts of neem tree bark (*Meliaceae*) reduce blood parasites in rats. Limonoids in *T. rubescens* have anthelmintic activity in chimpanzees. Furthermore, chimpanzees may eat soils to enhance the biological actions of *T. rubescens*; they ingest a certain soil shortly before or after eating *T. rubescens*. This particular soil (dominated by kaolinite) improves the anti-malarial activity of *T. rubescens* when eaten together. Lastly, repeated sampling of the bitter-tasting anti-malarial agent chloroquine by malaria-infected mice reduced blood parasite and death in these animals.

Behavioral self-medication
Avoidance
When parasitized herbivores are faced with a choice between manure-contaminated and non-contaminated areas, Non-parasitized animals avoid manure as well, but this behavior is exaggerated in parasitized animals. Avoidance occurs even when parasites-rich pastures are high in nutrients.

When infected animals are forced to graze contaminated pastures they graze further from the soil surface than non-parasitized animals thus minimizing parasite intake. Horses grazing in highly stocked pastures exhibit a “latrine behavior”, whereas horses grazing on rangelands, where the parasite risk is lower, defecate randomly while grazing.

Grooming
The salivary glands of ticks secrete molecules to decrease the ability of the host sensing the infestation. Many species of wild cattle live in tick-infested areas, but tick loads are usually kept to very low levels, primarily by frequent self-grooming. Do ticks trigger self-grooming, inferring that cattle are able to identify infestations? Ample evidence from many studies on antelope in Africa strongly supports the idea that grooming bouts occur in response to an internal cue that initiates grooming bouts at periodic intervals, resulting in removal of ticks before they attach and begin to feed.

An increased exposure to ticks, however, is also associated with increased grooming. The trigger for grooming may be histamine or the absorption of tick saliva released at biting. In other words, herbivores are aware of their tick burdens, although this awareness explains only a small part of their grooming behavior. The larger the herbivore, the less frequent are grooming bouts. Animals are well able to sense the presence of fleas, but grooming activity may be too energy-expensive to combat fleas.

Collectively, this information suggests herbivores are “aware” of the presence of parasites infecting their bodies and have a number of strategies to self-medicate to reduce the effects and strength of the infestation.

Sheep visit a grassland pharmacy in Utah

Sheep grazing in a pasture seem like the definition of a simple, pastoral scene. But that pasturing is more than just a sheep dinner room, it’s a pharmacy too, where sheep can be taught to select their own medicine.

Dr. Juan Villalba, associate research professor of foraging behavior in the Department of Wildland Resources at Utah State University, and his colleagues have found that sheep struggling with gastrointestinal nematode infection purposely select foods that act as medicines to help alleviate what’s hurting inside.

Tannins are secondary compounds produced by plants for their own purposes. Among other things, tannins can provide self-defense against foraging herbivores; can attract pollinating insects for reproductive purposes; can help resist dehydration and nutrient stress, and can provide protection from ultraviolet radiation.

They also have an astringent effect that sheep usually don’t like. They reduce the amount of forage sheep consume as well as inhibit protein digestibility. But at the right doses they also reduce the number of parasites in a sheep’s gut. A series of papers released by Villalba describe how animals with parasites prefer plants with secondary compounds.

Tannins, sodium bicarbonate, polyethylene glycol, and sericase lopespora are just some of the compounds that help ward off ailments such as internal parasites, Villalba says.

“What the animals do is like what we humans do when we have an upset stomach or heartburn,” he explains. “We seek to lower our discomfort, but when it’s done, we don’t keep selecting the medicine. The animals seek to return to a state of homeostasis or internal stability, so when the medicine is no longer needed, they have specific behaviors that respond to the end of a particular discomfort.”

**Pasture as Pharmacy: Tannins, an Example of Livestock Self-Medication**

Based on material at [www.extension.usu.edu/behave](http://www.extension.usu.edu/behave)

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**Dr. Juan Villalba at work**

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A sheep and cow share grazing rights on this healthy small farm. This newspaper contains news and features about organic food and farming in the Northeastern US as well as a Special Supplement on Animals and Health.

Organic farmers don’t use toxic, persistent pesticides.