Alternatives to Antibiotics: Acupuncture

Richard "Doc" Holliday, DVM, describes his experience treating a dairy cow just after completing acupuncture training for veterinarians, saying, "We had some friends up in Pine City, Minnesota. Of course, after you learn something you want every opportunity to use it. They were kind enough to let us come up. They had an old cow, their old pet registered cow. [She was] 17 years old and had a life-time record and all this stuff. She had calved and hadn't been in heat for seven months. Their vet had examined her. He said from his internal examination that her ovaries were shrunk to about a third of their normal size. She'd gone into senility. She'll never breed again. You might as well get rid of her. Well, that was the one they wanted me to look at."

Doc Holliday examined the cow in a different way. He put his hand on the cow's back to feel acupuncture points for the uterus and the ovaries. The cow was so sore at those points that she almost collapsed. Holliday used a hypodermic syringe to inject fluid into the acupuncture points. He explains, "We call that aquapuncture. Traditionally they put needles in and they'd twist them. . . . It takes too long. We can do the same thing by injecting fluids into those points. I injected 3cc of [vitamin] B_{12} in each of six points. That's all I did. Three weeks later she showed a mild heat. Three weeks after that she showed a strong heat. They bred her. She settled and subsequently had a calf. And the next time [the cow calved] they didn't call me. They just sold her, but I would have liked to try it again."

Chinese Traditional Medicine

For many American farmers and their veterinarians, acupuncture is only a system of medicine they may have seen once or twice on public television. While few American food animal veterinarians are trained in acupuncture, the technique is no longer uncommon with vets treating racetrack horses. Acupuncture is not new, of course. It is part of Traditional Chinese Medicine and has been widely used throughout east Asia.

Traditional Chinese Medicine formed around the idea that health is maintained by a balance of energy. If an organ has an excess or lack of energy, disease results. Following from this view, one way to treat disease is to transfer energy through acupuncture from places in the body with excess energy to areas deficient in energy.

Europeans traveling in China brought back many different ideas, including concepts about Chinese medicine. In the 1950's an Austrian veterinarian, Dr. Oswald Kothbauer, tried testing some of the theories of acupuncture on cows. A central concept of acupuncture is that particular points on the skin are related to internal organs and organ functions. Kothbauer artificially irritated individual organs in healthy cows and then searched for tender spots on the cows' skin. Kothbauer's map of tender spots on the skin matched the Chinese acupuncture points very closely.

A set of acupuncture points affecting the same organ or sphere of influence is called a meridian. The Chinese Art of Healing lists these basic meridians:

- The lung meridian.
- The heart meridian.
- The controller-of-the-heart meridian. This meridian is not linked to any particular organ but affects peripheral circulation, blood count, and nourishment of some internal organs.
- The small intestine meridian.
- The triple warmer meridian. This meridian is not linked to any particular organ but affects the regulation of function. The upper warmer regulates the function of circulation. The middle warmer regulates the processes of digestion. The lower warmer

regulates the functions of the urogenital tract. Western practitioners associate the triple warmer meridian with the endocrine system.

- The large intestine meridian affects diseases of the large intestine and secondary diseases of the teeth, gums, and skin.
- The spleen meridian.
- The kidney meridian.
- The liver meridian.
- The bladder meridian.
- The gall bladder meridian.
- The stomach meridian.

Kothbauer published charts showing the acupuncture points on the body of a cow. The bladder meridian that runs along the back of a cow is especially helpful because it serves as a main switchboard to alert the practitioner to health problems in other main meridians.

"So what good is it?"

During a seminar on acupuncture, Doc Holliday said, "When I first saw this chart, before I went to [acupuncture] school. . . . I was living in the Twin Cities. I knew a dairyman [who] had 40 to 50 cows that were in stanchions so you could handle them. I said, 'Can I come out to your farm and feel your cows?' He said, 'Yeah, that would be O.K.' It wouldn't upset them because they were used to strangers and so on. When I got out there I said, 'I don't want you to tell me anything about the cow. I just want you to show me a cow that you know has a problem, whether it's [a problem with] breeding or lame or whatever.' Don't get me wrong. I'm not telling you 'Doc Holliday is good at this stuff', I'm just telling you how good these charts are. . . He would show me the cow. I would poke each one of these [acupuncture] marks. I poked this one and I poked that one. I looked for a reaction on the part of that cow. Sometimes she just twists a little bit or maybe just flicks an ear. Sometimes it's more severe. Sometimes it's not. He showed me ten cows that day. I used Dr. Kothbauer's charts on those ten cows. It was truly amazing. Again, it's not anything I did. I give all the credit to him [Kothbauer]. We picked out 95% of what was wrong with those cows and never even talked to the owner. [The diagnoses were correct] even down to which quarter of the udder had a mastitis problem."

Holliday says, "Not every cow will talk to you. Not every cow will show you this. Some cows are so skittish they will react to anything you poke on. Some of them are so dead you could beat on them and they won't have a reaction. . . . I've been in veterinary medicine for 35 years. I think you can diagnose better on certain cows than you can with anything else. I don't care if it's lab tests or X-rays or anything else. [Acupuncture can be used for cows] and horses and any animal you can handle. I don't think this would work on an old Angus cow running out in the field because when you get her up, she's fighting mad. She's not going to tell you much. But an animal that you can handle, you can definitely diagnose a lot of problems and do a lot of things you can't do any other way. . .

"Now, you don't have to be a vet to do that. There's nothing wrong with knowing some of these points. When you're working over an animal, you can take your thumb and run down that backbone and run [your hand] down that place between certain ribs. And there's always a little dip there. The Chinese are very poetic sometimes. They say these acupuncture points are never on a mountain top, they are always in a valley. You can sometimes feel those little dips. If an animal is all of a sudden very sore on that spot, that tells you something. . . .It gives a person who is handling his animals a really good communication package. You can find out things about that animal you can't find out any other way. And you can find it out before they show symptoms. If you know that there's a problem there you can coordinate it with your other management. You can find out, 'Why is she sore? What's wrong with her?'

"[Consider] this liver spot [Fig. 3-3, Bl 44]. For example, you come in on a lot of cows on that last intercostal space, or the space between the last rib and the second to the last rib. Run your thumb down that and some of them almost kick your hat off. If they're sore there, they've got fatty liver. You know what to do then and you know what's causing it. . . .

"These are some things that you can do—that anyone can do. A dairyman can do that if his vet won't do it, and these charts are not all that hard to come by. . . . You can do things with your animals and find out things about your animals that you cannot find out any other way."

A Word of Caution

Anyone can use acupuncture points for diagnosis. However, administering treatment with acupuncture is considered practicing medicine and carries the legal burdens of state practicing acts. While treatment for some cases may be very straight forward, other cases may require in-depth knowledge of Traditional Chinese Medicine to find a successful treatment. Things can get complicated because stimulating a single acupuncture point may have multiple effects.

For example, the Bl 30 point shown in Figure 3-3 may become painful in cows that have swollen hocks. Bl 30 can be used to treat tender or swollen ankle joints, but it is also used for analgesia in the teats. Treatment at Bl 30 alone may not be sufficient for sore hocks depending on the cause. Acupuncture may need to be combined with adjustments in management or other treatments.

How Does Acupuncture Work?

Acupuncture was developed outside the framework of Western science. It is a medicinal system that comes with its own theories, some of which seem quite strange to people unacquainted with Eastern thought and philosophy. Western medicine can point to various changes in animals or people who are treated with acupuncture, including changes in hormone secretion, immunoglobin levels, and altered levels of neurotransmitter activity.

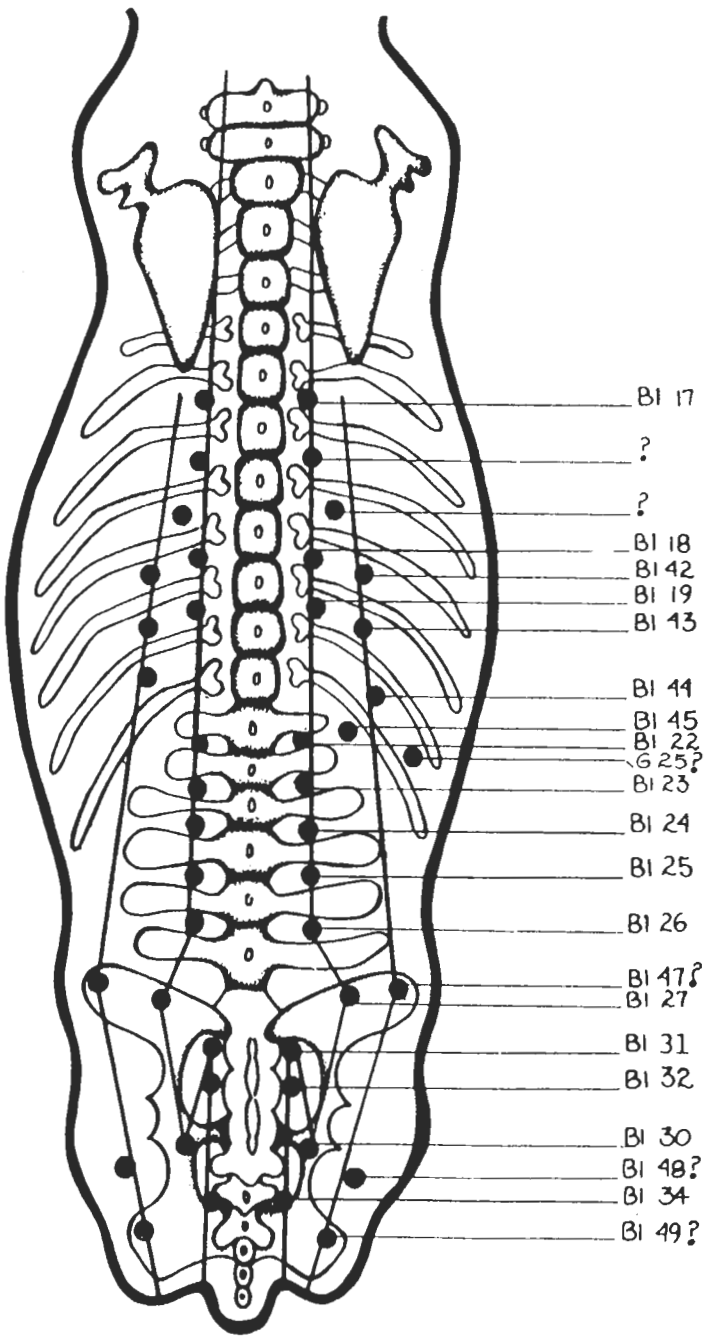
Kothbauer and other veterinarians have studied the anatomy of acupuncture points. Eight points of the bovine bladder meridian are associated with branches of spinal nerves. An additional 19 points of a cow's bladder meridian perforate the fascia near nerve bundles. The fascia is a sheet of fibrous tissue under the skin. Some acupuncture points are not anatomically associated with nerves, but are located at tendons or ligaments.

There isn't a single, simple explanation for acupuncture's mode of action, in part because acupuncture is used to do so many different things. Western research has mostly concentrated on how acupuncture blocks pain during surgery. The modes of action for other applications of acupuncture are less clearly defined.

Traditional Chinese Medicine doesn't include words like "electrochemical stimulation" or "hormone" or even "bacteria." The traditional theories of how acupuncture works inevitably get back to the balance of energy in living things. It's easy for Western veterinarians and acupuncture practitioners to talk past each other because the two systems have a different vocabulary and a different way of thinking about health.

These few pages provide a shallow and simple introduction to a rich and complex medical tradition. Acupuncture itself is only one part of Traditional Chinese Medicine. More veterinarians may have reason to study acupuncture as more farmers begin demanding alternatives to antibiotics.

Figure 3-3. Dr. Oswald Kothbauer devised this chart when he tried to label the points he found in cattle according to the human bladder meridian. This chart depicts the back or dorsal view. Cows have many more acupuncture points than are shown on this chart. Transposing the human bladder meridian directly to cows is difficult because of anatomical differences. Question marks are used to label some points because they did not represent a complete match. Older Chinese veterinary texts concentrated more on individual points in animals rather than focusing on the meridian systems. (Copyright © 1974 *American J. of Acupuncture*, Vol. 2 No. 2, p. 303, 1974) Reprinted courtesy of *American J. of Acupuncture*.



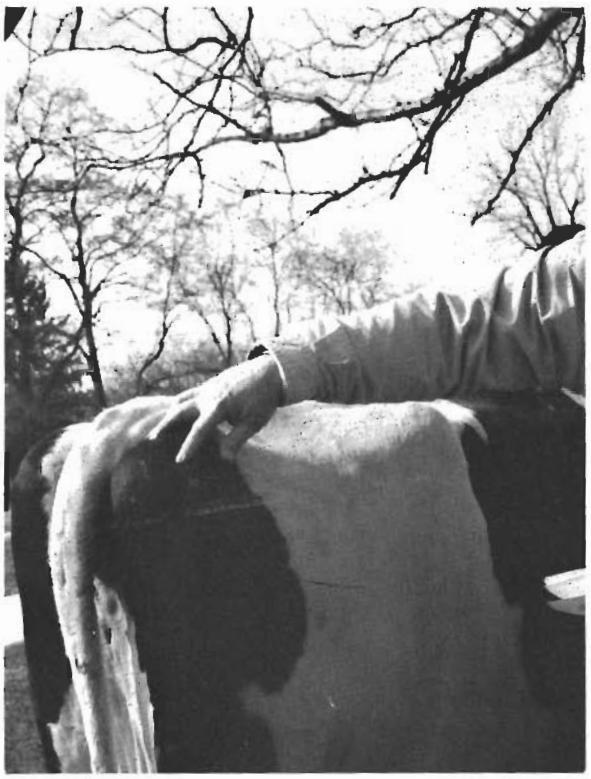
Selected points from Kothbauer's report of painful points on the skin following artifical irritation of internal organs with iodine.

Bl 17 lungs
? lungs
? lungs
Bl 43 liver
Bl 44 liver
Bl 22 right ovary
G 25? liver
Bl 23 right ovary
right kidney
Bl 47? uterus, right
Bl 27 uterus, right
Bl 30 ankle joint
rear right udder
Bl 48? rear right udder
Bl 34 rear right udder
Bl 49? rear right udder

Points for the left ovary, left kidney and left udder are found at corresponding sites on the left side of the animal.

R. Holliday demonstrates locating acupuncture points from O. Kothbauer's charts.

Rear right udder point Bl 49 at index finger.



Liver points Bl 44 and G 25.

Finding a lung point, Bl 18, about one hand length from the spine.

Holliday notes, " I do suggest that if you're going to treat a cow with acupuncture that you treat on both the right and left sides, so she has a chance to balance out. . . . The Chinese theories about acupuncture always get back to the balance of energy in the animal."

Additional Resources

The Chinese Art of Healing. Stephan Palos. 1971. Herder and Herder, New York. 235 pages. [The focus of the book is human medicine, but it provides background information.]

Veterinary Acupuncture. Alan Klide and Shiu Kung. University of Penn. Press. 1977. 297 pages. [Contains several cattle charts and illustrations. This book has a section on Kothbauer's work.]

Proceedings of the Fifteenth Annual International Veterinary Acupuncture Conference. 1989. Seattle, WA. International Veterinary Acupuncture Society. [Acupuncture charts can be confusing because different organizations have their own codes for the meridians. Page 154 of the 1989 Proceedings compares various letter codes for the meridians.]

'The Neurophysiologic Basis of Acupuncture,' F. W. K. Smith, Jr. pp. 33-53 in Veterinary Acupuncture. Subtitled: Ancient Art to Modern Medicine. Editor: Allen M. Schoen. 1994. American Veterinary Publications, Inc., Goleta, CA.

'Anatomy and Histology of Selected Bovine and Canine Acupuncture Points,' M. Egerbacher. pp. 27-31. in Veterinary Acupuncture. See reference above.

"A comparative study on the effectiveness of electroacupuncture and aquapuncture stimulation on infertility due to inactive ovaries in dairy cows." Xie Huishen, Chen Jiapu, et. al. *American J. of Acupuncture.* pp. 263-270. Vol. 22, No. 3. 1994.

I.V.A.S. Contacts

International Veterinary Acupuncture Society
c/o David H. Jaggar, MRCVS, Exec. Director
Box 142 - The Mail Station
1750 -30th Street
Boulder, CO 80301
[Will provide a list of referrals for people who send a self-addressed, stamped envelope.]

For brochures describing the International Veterinary Acupuncture Society short course for veterinarians contact:
Gary Dillon, DVM
7518 SE Hogan Road
Gresham, OR 97080
Tel. (503) 666-1500

Special thanks to Doc Holliday for his patience in explaining acupuncture to the novice.

Alternatives to Antibiotics: Homeopathy

Homeopathy is a medicinal system from Europe that was first developed for human health in the late 1700's. The founding father of homeopathy, Dr. Samuel Hahnemann, ingested cinchona bark and found that it produced symptoms similar to malaria. Dr. Hahnemann also found that a very dilute solution of cinchona bark could be used to successfully treat malaria. From this and other similar experiments, he developed the theory of "like cures like," or homeopathy.

Since cinchona bark is a source of quinine, one may come to the conclusion that the quinine content in Hahnemann's remedy explains his success in treating malaria. It is not that easy. Homeopathic preparations are made by a series of dilutions and succussions (vigorous shaking). Only a minute quantity of the original substance is present in any homeopathic remedy. This makes the remedies quite different from herbal therapies. People who practice homeopathy explain that it is an energy treatment, like acupuncture, not a chemical treatment like taking vitamin C pills. Animals treated with homeopathy cure themselves by having their own immune systems stimulated by the remedy. Practitioners of homeopathy stress that the remedies are not a substitute for preventive measures such as good nutrition, adequate housing, and proper sanitation.

In his book, The Treatment of Cattle by Homoeopathy, veterinarian George Macleod writes, "The difference between the conventional approach and the homoeopathic leads to the rejection by homoeopaths of the idea that destruction of bacteria is the main aim of the physician, because it is not the illness as such one has to treat, but the patient's reaction to it."

Because the goal of an antibiotic is the destruction of bacteria, when an antibiotic doesn't work we usually say the disease organism was not susceptible to the drug. This is an oversimplification since there are many limiting factors that can prevent a farmer or veterinarian from curing a cow. But when a homeopathic remedy does not work, we generally say the medicine was incorrect. Homeopathic remedies are not meant to be substitutes for antibiotics and their function is not destroying bacteria. If the cow is not getting better, the manager needs to review the case and possibly choose a different remedy.

People unfamiliar to homeopathy may wonder how long you should wait for a remedy to take effect. Homeopathy includes the concept that chronic disease conditions take a long time to cure and that rapid onset illness should be cured quickly. If a cow comes down with an acute disease in a few hours, the remedy should only need a few hours to take effect.

Behavior, Environment, and Specific Complaint

Diagnosis has a different emphasis in the homeopathic medicinal system. Animal emotion or behavior, environmental factors, and the specific complaint are all used to develop a symptom picture. Applying these rules to diagnose dairy cattle requires careful observation.

If a farmer or vet wanted to find an effective antibiotic for treating mastitis, a conventional approach would be to culture the organism to identify which bacteria is causing the infection. While a homeopathic vet might also want to culture the organism, that would not be the emphasis for determining which mastitis remedy the cow needs. For example, homeopathic preparations of Aconite can be used to treat mastitis, but it is most appropriate for acute cases with a sudden onset, especially after cold, dry winds. To be able to properly select

Aconite, the herd's manager must be aware of the cow's physical environment and the development of the specific complaint. Another signal for the use of Aconite is a cow that appears fearful or anxious in addition to the other aspects of the symptom picture.

In human homeopathy, emotions and mental symptoms or states are part of the diagnosis. For large animals, this is usually translated into observable behaviors. It is not possible to ask cows how they feel, but most managers can identify behavior that maybe interpreted as fearful, restless, or aggressive. Homeopathic vet Marta Engel says, "The most common behavioral symptom in my practice is that the patient is off-feed. Unfortunately this is usually too general a symptom to prescribe on. You need a lot more specific symptoms. If you can find three strong things that stand out in a case it aids the diagnosis."

Constitutional diagnosis, using attitude and body form as one of the cues for diagnosis, is also a possibility in homeopathy. During a farming conference, Engel related this story about one of the first cows she treated with homeopathy, "I wasn't sure what to expect. We had a cow named Flo, a Jersey. We had bought a group of Jerseys from one farmer who had bred them a little early, so they were all a little bit on the small side. She didn't have a very pronounced heat cycle. I examined her several times and found her to be cystic. I ruptured the cysts. I gave her all the proper hormone treatments—prostaglandins like Lutalyse® or Estrumate®—GNRH treatments like Cystorelin®. Those of you who dairy farm are familiar with these hormones. Cystorelin® is for cystic cows. Prostaglandin is used if the cow is not cycling but has a corpus luteum structure on her ovary. It's used to bring them back into heat. None of this stuff worked on her. She was about five months postpartum. I still had not seen her in heat. I was using all the proper applications of hormones and I wasn't having any results whatsoever. So I just observed her a little bit and went and got my [homeopathy] book out. I noticed she was kind of an apathetic cow. A little bit intuitively, I felt like I should try Sepia on her. Sepia is from the ink of a cuttle fish. It's a very good female remedy. It's often used in multiparous cows—cows that have had several calves—where there's a laxity of the pelvic ligaments and the uterus may be a little enlarged and overhung. But somehow this seemed to fit her. I gave her just one dose of the Sepia in the 200c potency. In a few days she came into a real strong heat. I bred her and she settled. That was my first experience. I felt that I had enough time with her over five months that it was not just a coincidence—that something major had happened here. This was twelve years ago."

Homeopathic Remedies

Homeopathic remedies are made from a process called potentisation. The pharmacy starts with the tinctures or titrates of naturally occurring minerals, plants, or animals. For example, Carbo Vegetabilis remedies are made from vegetable charcoal diluted in alcohol. Sulfur remedies are made from the mineral. Apis Mellifica is made from whole bees or bee venom diluted in alcohol. To potentise the substance, the pharmacist will dilute and vigorously shake the remedy at each dilution.

The potencies are written as Roman numerals in lower case. For example, a remedy that is marked 1m is a one-to-one-thousand dilution. When a veterinarian recommends a higher potency remedy they are recommending a medicine that is more dilute and more succussed (shaken).

When the potentisation is finished, the remedies are imprinted on lactose pills or put in alcohol solution. A dairy farmer giving a cow a high potency homeopathic remedy is literally giving their animal a sugar pill that isn't a placebo.

Remedies like Belladonna and Conium Maculatum [hemlock] are poisons in their original form. Macleod reports that the original substance will lose any toxic qualities by the third centesimal dilution. Because the amount of original substance is so small, there is a vanishingly small chance of any chemical side effect. However, if a person is not convinced that energy can be transferred by shaking a substance in vitro, we would be at a loss to explain the efficacy of the remedies. Dr. Engel says, "The point is that we are using a minimum dose to achieve a cure. By observation one can learn how it works."

Deciding on the correct dosage of a remedy is a complex subject, but the number of sugar pills to give the cow is not at issue. Most dairy farmers administer eight pills to a cow for one treatment. The tricky part is deciding how often to give the remedy and in what potency. A rule of thumb is that acute diseases should be treated with high potencies and treated very frequently. Chronic conditions should be treated with lower potencies. There are variations on this general theme. Farmers beginning to use homeopathy may want to rely on a textbook or their veterinarian in determining dosages.

Homeopathic remedies are not toxic and do not need any milk withholding, but they are not labeled for use in veterinary medicine. As off-label drugs, a milk inspector technically may ask to see a veterinarian's prescription for the remedies. Carl Pulvermacher says he was able to explain to his milk inspector the nature and use of the homeopathic remedies in the barn's medicine cabinet, but it would have been easier to store them in the house. Remedies should not be stored by strong mentholated products like camphor or strong odors like creosote. The best place to store remedies is in a cool, dry place in their original containers. Remedies should not be exposed to strong sunlight.

Nosodes

Nosodes are a special category of homeopathic remedies that are made from the disease processes of animals. Nosodes serve much the same function as vaccines, strengthening the animals immune response to prevent disease. In some cases, the original substance may be a potentised filtrate of the bacteria and endotoxins. For other nosodes the lymph glands, nasal discharge, or bowel movements of sick cattle are the original substance. Auto-nosodes can be prepared for a specific animal that is not responding to other treatment. Because of the restrictions on importing the derivatives of disease organisms, nosodes manufactured in the United Kingdom are not easily available in the United States.

Administering Homeopathic Remedies to Cattle

Homeopathic remedies are absorbed by the mucus membranes. In human medicine, the remedies are generally placed under the tongue. Dairy farmers have developed different methods for applying the remedies to their cows. Marta Engel is able to lift up the lip of her Jerseys to administer the remedies. Vicki Braun uses a plain halter to control the cow's head and then uses an empty vial (like a cover from a plastic sterile syringe) to insert the pills into the mouth. Cathy Pulvermacher sprinkles the remedies on the feed. In classical homeopathy, the remedies are not taken with food. However, the practical difficulty of getting a cow to accept the medicine has led some farmers to favor this method. A key point to remember is that getting the remedy into the mucus membrane of the mouth is sufficient. It is not necessary for the cow to swallow the remedy for it to be effective. If there is a need to treat a cow over a period of days, putting the halter on snugly and leaving it in place tends to be the least stressful for both the cow and the handler. Using a plain halter instead of one with a rope helps prevent

the cow from getting tangled and working the halter off.

Nosodes can be administered in the herd's water. Nosodes and liquid remedies may also be applied to the cow's nasal area with a vaporizing squirt bottle.

Success and Failure with Homeopathy

Homeopathic vets have reported success in treating a wide range of disorders in cattle including reproductive problems, infectious diseases and metabolic disorders. Cathy Pulvermacher advice about homeopathy is, "Treating your animals with homeopathy, you're going to do no harm. We found that treating your animals this way, you really don't stress them. Get a kit and try it." Vicki Braun says, "I would suggest trying some of the easier remedies that you can tell the symptoms on—udder edema, blood in the milk right after calving, and ringworm—those types of things. Use those first. See it work and then you can pursue such things as mastitis, which are more difficult."

Organic dairy farmer Dan Patenaude says, "Using homeopathy is hard. There's a whole different system to learn." These few pages are only a cursory introduction to homeopathy. Several resources are listed for readers who wish to learn more about the subject. While using a different system of medicine can be imposing, Doc Holliday says, "Try it out. Pick out one simple thing. You don't have to go to school for a hundred years to learn how to use these things. The worst thing that will happen is that it just won't work. You haven't poisoned anything. You haven't killed anybody."

Homeopathic vets, like many alternative practitioners, are sometimes dismissed as quacks by their peers. There has been little effort to conduct controlled research to either prove or disprove the effectiveness of homeopathy in the United States. The authors of this book have included this section not because of a supporting body of scientific evidence, but because farmers seem to be having success with this method. That does not mean that every cow treated with homeopathy has recovered.

A farmer had four cows contract pneumonia in one season. Two of the cows were treated successfully with Bryonia. Another two cows did not respond to Bryonia but did respond to Phosphorus 30c. One cow from the second group relapsed and then did not respond to Phosphorus. Additional support therapy was given with daily 30 cc injections of vitamin C and 12 cc injections of vitamin B_{12}. The cow went off grain and was switched to a non-medicated commercial calf feed with molasses. The animal continued to decline, it's breathing became labored with normal exercise and it went off the calf feed. After significant loss of body condition and no improvement, the cow was put down. The farmer said, "I had a lot of confidence in Bryonia until this happened. I'd been using it on and off since 1988. This is the first time it hasn't worked in a pneumonia or a respiratory case. Maybe there were other reasons with this cow. Maybe she had pneumonia as a calf or something I wasn't aware of that contributed to this case."

In discussing this case Dr. Engel wrote, "I think one of the problems in this case is that we sometimes get too routinist. We tend to think that we can use homeopathic medicine like the conventional approach i.e. giving "this for that." The problem is that in each case we need to find the remedy that is similar to that individual animal. We don't just give Bryonia because she has pneumonia. Certainly this medicine is often indicated, but there are many other medicines that are also useful depending on the symptom picture. The other factors involved in curing disease have to do with the degree of tissue damage already present and the amount of energy that an animal has to have to be able to heal itself. The homeopath calls this latter energy the "vital force." Older animals or animals with a long history of chronic

debilitating disease often have a weak vital force. So sometimes due to a weak vital force or too much tissue damage (i.e. pathology such as tumors, severely damaged organs, etc.) an animal may be incurable. One other limiting factor is that it may be difficult for the farmer or veterinarian to clearly see all the symptoms of the animal in order to prescribe the best medicine. Despite all these obstacles to cure you can see we can still have a great measure of success with homeopathy, without all the side-effects and drug residues inherent in the conventional approach."

Is homeopathy a sure cure? No, but neither are antibiotics. Homeopathy is not a cure-all or a substitute for disease prevention. The remedies are one tool of possible support therapy that have been used effectively on organic and conventional dairy farms.

Homeopathic Pharmaceutical Companies and Booksellers

Homeopathic Educational Services
2124 Kittredge St.
Berkeley, CA 94704
(510) 649-0294

Community Pharmacy
341 State Street
Madison, WI 53714
(608) 251-3242

Quintessence
334 W. Lakeside
Madison, WI 53711
(608) 251-6915

Standard Homeopathic
210 W. 131st Street
P.O. Box 61067
Los Angeles, CA 90061
(800) 624-9659

American Holistic Veterinary Medicine Association
2214 Old Emmorton Road
Bel Air, MD 21015
(410) 569-07905

Minimum Price Homeopathic Books, 250 H Street, Blaine, WA 98231. (800) 663-8272

Marta Engel, DVM
Rising Sun Veterinary Clinic
Rt. 1 Box 1198
Soldiers Grove, WI 54655
(608) 734-3273
FAX (608) 734-3306

Hilltop (formerly Naples Natural Supply)
P.O. Box 7
Mondovi, WI 54755
(715) 926-5020

Additional Resources

The Treatment of Cattle by Homoeopathy. George Macleod, 1981. C.W. Daniel Company, Ltd. 148 pages.

Veterinary Materia Medica with Repertory. George Macleod. C.W. Daniel Company, Ltd.

The Organon of Medicine. Samuel Hahnemann.

"An introduction to homoeopathy for cattle." Chris Day, MRCVS VetMB. *New Farmer & Grower*. Summer 1991. pp. 21-23.

Homeopathic Treatment of Beef Cattle and Dairy Cattle. Christopher Day, MRCVS. Beacons Field Pub., Ltd. England. Available through: Minimum Price Homeopathic Books referenced above.

Excerpt: Homeopathy for the Modern Dairy Farm

by Marta W. Engel, D.V.M.

Basic Medicines to Consider for Injuries and Inflammation of the Bovine Udder

Arnica	Always use after injury or bruising, worse from touch.
Hypericum	If a stepped-on teat is very sensitive; generally useful for tissue-rich in nerve endings. It can also be used as Hypericum/Calendula 50:50 tincture. Dilute 1/10 and soak teat. Also you can tape the teat if the end is damaged.
Ipecac	If milk has blood in it due to bleeding from damaged capillaries. It may follow Arnica.
Aconite	Acute onset after exposure to harsh dry winds or chill—*fear, restlessness, sudden onset*—often have high fever in early to acute stages.
Apis Mellifica	Puffy, shiny, with fluid; swelling—very good for udder edema which is better by cold, worse from heat and touch.
Belladonna	Acute onset, hot, swollen, painful, red, dilated pupils, thirstless, full bounding pulse, very sensitive to light and noise.
Bryonia	Very thirsty, worse from motion, better from pressure,* swelling and inflammation not red but very hard.
Hepar Sulph	Oversensitive to pressure, threatened suppuration, discharging purulent material, infected.
Silicea	Weakness of connective tissue, somewhat sensitive to pressure, recurrent flare-ups with scar tissue.
Phytolacca	Knots or "caked." Swelling in udder abscessing; hard, painful.
S.S.C.	Combination of Sulphur, Silicea, and Carbo Veg. Very popular and effective for average mastitis case.

* If a cow with mastitis tends to lay on the affected quarter, a homeopath would call the illness **better from pressure**. If the symptoms are worse when the cow moves, the illness is called **worse from motion**. These particular indications would help steer the manager toward using Bryonia.

I will elaborate some on the most commonly used medicines for mastitis. **SSC** is very popular because we've seen so much success with it. Though it doesn't work in every case, it does help a lot of average cases. There may not be a lot of inflammation—low grade at best, some clots or chunks in the foremilk, and the case may be recurrent. Usually the cow does not display any systemic illness. **SSC** 3Oc two times per day for two to five days will often clear the case. Often the left side of the udder is involved.

When the right side of the udder is caked and hard from the outset of freshening and some clots or stringy milk are present, often **Phytolacca** 30c will be indicated.

Aconite, Bryonia, Belladonna all tend to have a more acute component with more systemic involvement.

Another medicine not mentioned previously is **Pyrogen**. It can be used if septicemia is suspected. There is often a discrepancy of pulse and temperature: The temperature is high and the pulse is slow; or the temperature is low and the pulse rate is rapid. The discharge may be very foul smelling.

In very acute cases with high fevers and very ill animals, I often use a high potency (i.e., 1m) and repeat it often—every 1/2 hour to one hour for four or five doses (i.e., **Belladonna 1m, Pyrogen 1m**, etc.).

For the more subacute and chronic cases, I generally use 30c. In the case of chronicity with pathology, such as scar tissue in the mammary gland, we may use a 200c but only two or three times per week (i.e., **Silicea** 200c).

The medicines are administered in #35 to #40 pellets—usually about eight pellets under tongue per dose.

For mastitis prevention we can use nosodes made from the common mastitis causing organisms (i.e., *Strep. ag.*, *Staph. aureus*, etc.). These can be dissolved in water and 5-10cc can be added to the water tank once a week for four weeks and then once a month for four months. I have not seen a lot of conclusive trials on this method, but Dr. Macleod says that within six months to one year you will see the difference in a herd. We squirted the nosodes on the feed in our barn for a week or ten days and saw a drop in cell count of about 100,000.

There are so many factors affecting mastitis and cell count that without a controlled study the effectiveness of the nosodes are difficult to assess. Certainly if farmers feel they are deriving benefit from this practice and want to take the time to do it, then it is worth the effort.

Not only is the mammary gland of the dairy cow under constant stress, but the reproductive organs also are expected to be at peak performance and allow the cow to continually give birth every 12 to 13 months as an ideal. There are many breakdowns in this system as we all know. Cows are subject to difficult births, retained placenta, postpartum discharges, mastitis, and many types of infertility.

For a difficult birth and bruising of the birth canal, **Arnica** and **Bellis Perennis** are indicated. If the cow retains her placenta we've used **Caulophyllum** early on for a few days with good results. **Caulophyllum** has a tonic effect on the uterine musculature. If the cow contracts an acute or toxic metritis, one must think of **Aconite, Belladonna, Pyrogen,** and **Echinacea**. Intra-uterine infusions of **Calendula** and **Echinacea Tinctures** may be necessary.

If the postpartum discharge is thin, dark, and offensive, **Secale** is useful. **Secale** is made from ergot, which has an alkaloid ergotine, a powerful stimulant to uterine musculature. After the discharge becomes white and bland, **Pulsatilla** will usually help clear the discharge. In some protracted cases, **Hydrastis**

Canadensis (golden seal) has helped, or **Sepia** might be considered if the uterus is still large and distended over the pelvis and the pelvic ligaments are lax. The cow may have a reverse tilt between the hooks and pins.

For infertility problems **Pulsatilla** is excellent for inactive ovaries. The cow may be dainty and mild-mannered. **Sepia** is useful where the uterus is enlarged or subinvoluted and difficult to pull up over the pelvic brim. The cow may be multiparous and she may seem apathetic. **Cal Phos** is also useful for inactive ovaries. The cow is constitutionally very dairy or sharp. Her calcium/phosphorus mineral balance is always on the edge. She also may be on the frail side. **Cal Phos** will help activate the ovaries by bringing her system into balance. For the cow with an active temperament, good appetite and very small, inactive ovaries, **Iodium** is very helpful. Often we see this pattern in rapidly growing first calf heifers.

Homeopathy is exciting because we are working with natural substances and we are able to interact with the cow's immune system to bring the vital force to a higher energy level. Too often with conventional drugs—antibiotics in particular—we lower the cow's resistance and she becomes chronically ill.

The pace of the modern dairy operation is intense for all. Stimulating the immune system by good nutrition and homeopathy means greater health with little or no chemicals. This is much better for the cow, the products the cow produces, and economically for the dairy producer. The health of the farm starts in the soil, then the feed, and lastly good management. Then if health fails we have a natural means of cure. The dairy producer no longer has to rely on drugs to solve all his problems and the veterinarian has many more options for treatment.

Homeopathy for the Modern Dairy Farm was written for veterinary practitioners. If a cow's condition is serious please consult your veterinarian to determine the appropriate treatment.

Herd Health and the Environment: Fly Control

Sanitation Is The Key

University of Wisconsin Entomologist Walter Gojmerac says, "Sanitation can replace insecticides, but insecticides will not replace sanitation. We have known since the 1800's that sanitation is the key to fly control." Gojmerac is quick to add that a single pound of fresh manure is sufficient material to breed 500 flies. In addition to manure management, a barn should be cleaned of wet or spoiled grain that can collect in corners. Flies are able to feed on almost any rotting organic matter, manure, or garbage. Gojmerac says, "If barn cleaning isn't meticulous, you can have one or two breeding sites and that is enough to produce lots of flies."

Calf pens that are not cleaned weekly are a typical breeding ground for flies. If manure is piled to be spread later, there is always a place for flies to breed. Entomologist Bob Gillespie recommends that farmers who are piling manure should stack it as steeply as possible. A pile that sheds water will minimize wet spots that are "nice breeding sites for flies." Composting manure is another option.

Chickens & Ducks

Mixed livestock production has gone out of style, but farms with a few free range chickens or ducks benefit from free fly control. Chickens will work manure pats and manure piles for fly larvae and adult insects. Free-range chickens will also help clean up spilled grain around feed bunks and calf hutches.

Joanne Henkes, a dairy farmer from Seneca, WI, recommends their farm's black Muscovy ducks. Henkes says, "As far as fly control they're doing their thing. In spring they keep the lawn clipped. They're wonderful fly control. I don't know why more people don't do it." The only drawback to keeping ducks is their tendency to swim in stock watering tanks. Henkes says, "We have drinking cups and they can't get into them as easily. These ducks really do work."

Fly Parasites

Fowl are one kind of biological control for flies. Insects that parasitize fly pupae are another form of biological control. The parasites are out there in nature, but they can also be purchased in large numbers from commercial insectories. Females of tiny wasp species like *Spalangia endius*, *Muscidifurax zaraptor,* and *Spalangia nigroaenea* will lay eggs inside fly pupae. The young parasites eat and kill the fly pupae during the course of their development. The wasp species that parasitize flies do not sting people or cows.Unfortunately, nature seems to assure that there is always more of the prey than the predator. The female parasitic wasp may lay up to 50 eggs, but female house flies lay eggs in batches of 100 to 150.

It's important to remember that the beneficial insects are pupal-stage parasites. They cannot kill adult flies, they can only prevent a population surge. Commercial parasites are not effective against deer flies that breed in widely dispersed areas.

Do purchased parasites work? University research has not yet been able to document large drops in adult fly levels around livestock confinement areas and dairy barns.

Organic dairy farmer Carl Pulvermacher tried releasing fly parasites one year and felt that the parasites did work, but he has not continued purchasing them.

Jim Wedeberg released fly parasites in 1992 as an experiment for KORN. We recovered parasitized fly pupae, but we also found lots of healthy fly pupae. Adult fly numbers counted from check strips were erratic and did not follow any discernible pattern. Wedeberg summed

up this way, "I don't really know if it worked. This is more money than I've ever spent on fly control." The cost for one season was $180.

Augmenting the populations of fly parasites may be economical in some situations, but it is probably most beneficial in southern areas where freezing temperatures do not interrupt insect life cycles. Farmers who choose to purchase parasites will want to work with a supplier that gives its customers information on pest identification, parasite life requirements, and release timing.

Soap & Water Sprays

Organic dairy farmers Al and Lisa Hass spray their cows with a mixture of Basic H® and water to knock the flies off. Hass uses a simple garden hose and puts the soap in a metering device that was intended for the application of lawn fertilizer. When flies become saturated they drop to the floor. Other organic farmers have used backpack sprayers to apply a one to four mixture of Basic H® and water to make the cows more comfortable during milking.

Stinky Traps

Several different brands of stinky traps are available at farm supply stores, and yes, they really do stink. Flies are lured into the traps with a few ounces of feeding attractants and pheromones (insect sexual attractants). Stinky traps sell for $12 to $25 and refill bottles of pheromones are also available. Most of the people who use the traps agree that this method works. However, hired help may be reluctant to clean the traps of the hundreds of fly bodies that accumulate in the container. Rotting meat is an excellent fly attractant for people who want to build their own traps.

Sticky Traps

Any type of fly paper can fall into the category of sticky traps. Cardboard cylinder and string sticky traps put a new spin on the old idea of fly paper.

Westby dairy farmer, Walt Griffin, uses a Sticky Roll Fly Tape®. It is a long string-coated with a sticky substance and hung from the ceiling of the barn or milking parlor. Griffin says, "It's so effective that we no longer use our old fly traps. It also catches bats and swallows, but we haven't had any fatalities yet. My wife has put white paper toweling over the string near the barn swallows nest so the swallows can see the string. We had a lot fewer problems with swallows after that. The initial purchase was $59 and we have restrung the barn five times on that. A refill unit costs $19. We still have flies, but it sure does keep the population down to manageable levels."

Keep in mind that setting up sticky traps can be messy and the traps will need to be replaced or scraped once they are full of flies.

Herbal repellents

Herbal preparations are allowed on organic animals, but they may be too costly for routine use with food animals. Citronella and pennyroyal are commonly known as insect repellents.

Physically Dislodging Flies

Some farmers have hung plastic sheets or jute cords over barn entrances to knock the flies off the cows. Once they are dislodged, flies will gravitate towards the light outside instead of a darkened barn.

Carl Pulvermacher built a walk-through fly trap complete with a bag to dust the cows' backs with diatomaceous earth. The sides of the trap are waffled layers of perforated metal and screen. The flies are knocked off by jute cords. When the pests fly toward the light, they become trapped in the screens. The cows were reluctant to enter the fly trap at first. They needed to be trained to walk through the plywood structure. Pulvermacher says, "They got to knowing that this was going to feel good."

Walk-through fly trap

Diatomaceous Earth (D.E.)

Diatomaceous earth is mostly silicon. This product is mined from the sediments of ancient sea beds layered with the bodies of tiny sea plankton, the diatoms. The microscopic sharp edges of diatom cell walls can cut or pierce soft bodied insects. Some farmers sprinkle D.E. in their window sills to discourage flies. Do not breathe in diatomaceous earth, as it can damage the lungs. If the manufacturer suggests wearing a face mask, follow the product instructions.

Ventilation

Good ventilation won't kill a fly, but it will make workers and cows more comfortable. Crawford County Wisconsin dairy farmer Gene Fritche reported that with tunnel ventilation the flies just didn't hang around the barn. While tunnel ventilation is expensive to install, a three mph artificial wind discourages flies and provides excellent air exchange.

Additional Resources

"Identifying and Controlling Flies on Dairy, Beef, Other Livestock, and Pets," *University of Wisconsin-Extension Publication A2118.* W. L. Gojmerac. 1991.

"Commercial and Naturally Occurring Fly Parasitoids *(Hymenoptera:Pteromalidae)* as Biological Control Agents of Stable Flies and House Flies *(Diptera:Muscidae)* on California Dairies," *Journal of Economic Entomology.* June 1990. Vol. 83. No. 3. pp. 799-806.

"Biting back . . . parasitic wasps help us control flies," Terry Downs. *Hoard's Dairyman.* March 25. 1992. Vol. 137. No. 6. p.266.

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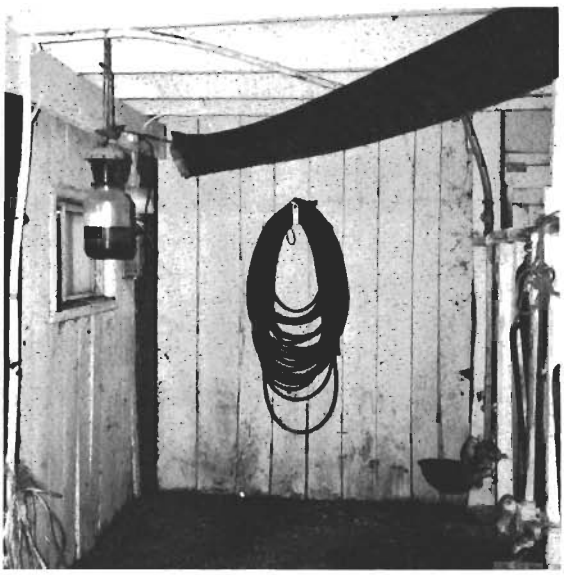


Sticky Traps and Stinky Traps

Herd Health and the Environment: Parasite Control

Biting and Sucking Lice

A veterinarian asked, "What do you organic people do for lice? Sometimes the animals at the county fair are peppered with lice." Direct contact with a carrier animal is the most common route of transmitting biting and sucking lice. Picking up lice from contaminated brushes, equipment, or facilities is possible, but less likely. An organic farmer needs to do everything possible to prevent lice infestations.

Louse Biology and Life Cycle

A mature louse is visible without the use of a hand lens. Lice eggs, known as nits, are quite small. Nits measure two to four hundredths of an inch, which makes a magnifying glass useful to see them clearly. At least three different species of lice bother cattle, but the nits are generally more cigar-shaped than round and are found attached to individual hairs. In one to two weeks the egg hatches into a larva that sucks blood or feeds on skin scales. The larvae, which go through a series of molts, reach maturity in 20 to 30 days. Larval and mature lice cannot survive for more than a week without feeding on a host animal.

Indoor housing upsets the natural balance between host and parasite. Cattle on pasture are usually not severely affected by lice. In the barn the number of lice per animal soars, causing restlessness and hair loss.

Lice not only irritate animals, they also aid the spread of ringworm and mange. Mange mites travel from animal to animal using routes of infection very similar to lice. Management programs that prevent the spread of lice will also help prevent mange.

Consider Stock Sources

Purchasing cattle needs to be approached with extreme caution. Jim Wedeberg says, "The sale barn is the last place I would look for a calf."

The organic standards require purchasing organic stock if animals of an acceptable genetic quality are available. In the absence of acceptable organic stock, a farmer may consider other sources. A purchased cow or calf should be inspected closely for lice and communicable diseases before they are put with other cattle. A calf with areas of thin hair should be suspected of carrying lice. Animals that have been on pasture may have very low levels of lice that are difficult to detect. If the purchaser is not absolutely sure an animal is clean, the replacement should be quarantined before mixing with the rest of the herd. If a show animal returns from the county fair, a quarantine may safeguard the rest of the herd. Bear in mind that an animal that has picked up nits may need time to show the larval form of lice.

Biting lice or little red lice often congregate at the base of the tail. Blood sucking lice are more likely to inhabit the folds of skin on the neck, head or legs. Cows in quarantine that rub themselves frequently or show signs of irritation should be checked again for lice, mange mites, and ringworm.

It's not practical to inspect a rented bull for lice, but the bull's owner should be able to answer questions about the incidence of skin parasites in their herd.

The Closed Herd

For farmers who routinely purchase replacements, the suggestion of a closed herd seems extreme. It is not extreme when one considers the incredible headache of dealing with lice or infectious diseases without reaching for an insecticide or an over-the-counter drug. Raising all replacements is an excellent way to prevent lice outbreaks.

Physical Removal and Insect Repellents

Facilities may be disinfected by pressure washing with soap, bleach or another approved cleansing agent when the livestock are not present.

Some farmers deal with lice by clipping the cow's coat. A ShopVac® can be used to clear away the clippings and physically remove lice from the coat. Vacuuming is often combined with a dusting of diatomaceous earth.

Citronella oil, other herbal repellents, soap and water washes, or homeopathics can be used to make a cow a less attractive host.

Herbal Insecticides

The root extract rotenone and pyrethrum daisies are poisonous to insects but have relatively low mammalian toxicity. The O.C.I.A. standards neither endorse nor forbid the use of these herbal insecticides. A certified farmer may want to discuss herbal insecticides with their local chapter before making an application. The FDA has set a zero tolerance for the presence of any insecticide in milk, organic or not.

The controversy in organic farming over the use of herbal insecticides revolves around "nozzle head" thinking. If broad spectrum herbal insecticides simply replace synthetic insecticides, organic farmers will still be paying out money to supply companies and inadvertently selecting for insecticide resistant pests. O.C.I.A. inspector Robert Caldwell comments, "My personal feeling is that it [using herbal insecticides] would be O.K. once, just don't make a habit of it."

Rotenone is known to be ineffective against nits and would require multiple applications as more lice larvae hatched. The authors are not aware of any over-the-counter natural pyrethrum or rotenone products registered for lactating cattle, nor are we aware of any farmers who are actually using herbal insecticides for lice control.

Ringworm (Trichophyton verrucosum)

Ringworm is a fungal infection of the skin and hair follicles. This disease can be passed to people.

It is possible for cattle to contract ringworm at any age, but calves are the most susceptible. The hair becomes brittle in the infected areas and falls out, leaving the characteristic bald, circular lesions. Animals with ringworm will rub themselves on any convenient post, tree, or water trough to relieve the itching. This behavior insures the spores will be well distributed to begin the next round of infection.

The only way to prevent ringworm is to keep the cattle from contacting infected animals or facilities. Sanitation and rotating housing can help prevent ringworm, but the fungi are not easy to get rid of. The Veterinary Book for Dairy Farmers states that spores can live up to four years in a dry place.

Fortunately, most animals recover without treatment. Ultraviolet light kills the fungus, so one cultural control is to turn the animals outdoors. Cattle on pasture can still get ringworm, but the lesions tend to heal more quickly. Good nutrition will also speed healing. Several veterinary texts recommend injections with vitamins A, D, and E.

The biggest concern is that a calf will open a wound while scratching itself and a secondary bacterial infection will begin. A topical application of 7% iodine is conventional treatment for both ringworm and superficial infections that is acceptable by organic standards.

Internal Parasites

Cattle are subject to a number of gastrointestinal parasites. These organisms have complex life cycles, but the common infection route is usually ingesting manure, contaminated feeds or contaminated water. Resting pasture, rotating pasture, and manure management are the first line of defense against the transfer of

internal parasites. Some parasite life cycles can be broken by grazing other livestock after cows and denying hatching parasites a suitable host.

Adult cattle have a greater ability to tolerate moderate parasite loads. Calves are the most susceptible and should be given the cleanest pasture available. Frequently cleaned individual calf hutches in an area away from the manure of mature cows can help prevent the spread of internal parasites.

Diatomaceous Earth As A Wormer

Organic livestock producers are divided on the effectiveness of diatomaceous earth as a wormer. Doug Gunnick of Gaylord, Minnesota, feeds D.E. free choice in a 50% mix by volume with salt or minerals. He purchases dairy calves at four to five hundred pounds, pastures them, and resells the animals as springing heifers. Gunnick reports that some calves come to his operation in rough condition, but his customers have commented on their glossy coats by the time the heifers leave. Gunnick say, "My feeling is D.E. will only work when we get feeds that have not been pushed too much with commercial fertilizer. I don't think D.E. lacerates internal parasites the way we've been told. I think it works by raising the immune system." Gunnick bases these comments on the observation that when D.E. is first presented to the animals, they seem to crave it. Consumption goes down when it is always available.

Dr. Gary Osweiler of Iowa State completed a preliminary trial in 1994 with D.E. incorporated as 5% by weight in grain pellets fed to pastured sheep. A group of twelve sheep received no wormer as a control. A second group of twelve sheep received daily does of D.E. in their grain pellets. The pasture had a moderate parasite load and had not received any chemical applications in several years. At the end of the season weight gains were similar in the two groups but the sheep that received the D.E. had less parasite egg masses in fecal samples. The difference was not statistically significant and Osweiler would like to repeat the study with more animals.

Commercial organic sheep producers have had inconsistent or poor results with diatomaceous earth. In 1993, David Deutcshlander of Pine City, Minnesota, had excellent worm control feeding free choice D.E. mixed with salt to lambs and ewes grazing a large pasture. In

Herd Health Controls Listed by 80 Farms Applying for Organic Certification

Controls for Lice	
Diatomaceous earth	20
Clip and vacuum	2
Vacuum	1
Clip and brush	1
Dust with CalPhos on back	1
Wait for spring	1
Soap and water (Basic H)	1
Dust with wood ashes	1
Vacuum and dust with D.E.	1
Unsolved problem	2
Not a problem on this farm	49
Total farms reporting:	80

Controls for Ringworm	
Motor oil (not an approved control)	1
Homeopathics	5
Dilute bleach	1
Blue Coat®	1
Copper Top®	1
Sunshine & fresh air	2
Vitamin soak on calves	1
Topical iodine	2
Not a problem or no controls	66
Total farms reporting:	80

1994, Deutschlander's stocking rate increased and the sheep did not perform well. Internal parasites were part of the performance problem.

Ken Raspotnick tried feeding D.E. in a mineral mix but reports, "We didn't have success with it. I'm not saying that it can't work. Maybe I wasn't feeding enough of it."

Diatomaceous earth is usually listed as approved organic parasiticide, but the jury is still out on the best feeding method and its level of effectiveness.

Homeopathic "Wormers"

Homeopathic remedies don't kill internal parasites, but some farmers use them instead of wormers. Cathy Pulvermacher started noticing rough coats on pastured first year calves during a wet spring. When she added 3/4 of a cap of a homeopathic remedy into a clean stock tank once a month, the calves improved. While Pulvermacher doesn't have a complete record of fecal samples to prove the remedy's effectiveness, she compares the calves' good performance with a neighboring farm that lost several calves to lungworm that season.

Lungworm Vaccines

Attenuated lungworms, *Dictyocaulus viviparus*, are available by veterinary prescription in Great Britain, where constant wet weather makes this parasite a real menace. In this instance, the attenuation is done by irradiating the worms. The lungworms are administered alive as a drench and the animal's immune system becomes sensitized.

All vaccines are currently allowed in certified organic production, but some organic material review boards are leery of live attenuated vaccines. The concern is that the non-virulent organisms may regain the ability to cause disease.

While the use of attenuated organisms for parasite control is mostly an academic matter in the United States, it may become an important issue if vaccines are developed for round worm or stomach worm.

Additional Resources

"Control Parasites Organically? Management skills - not miracle cures." Randy Kidd, D.V.M. *The New Farm*. Nov/Dec. 1993. pp. 7-11.

"Evaluating Diatomaceous Earth as a Wormer for Sheep and Cattle." David Deutschlander, principal investigator. p. 19 *Greenbook '94*, Energy and Sustainable Agriculture Program, Minnesota Department of Agriculture. St. Paul MN 55107

Veterinary Book for Dairy Farmers. R.W. Blowely. 1990. Farming Press Books. (Lice information on page 59.)

"Diatomaceous Earth: Some Uses in Modern Agriculture." H. D. Johnson, Vet. Surgeon. *Synergy*. Vol. 2 No. 2. p. 36. Spring 1991.

As a Shepherd sees it...A Test of Diatomaceous Earth for Parasite Control in Sheep. Peter and Hilary Wood. Wisconsin Department Agriculture Trade and Consumer Protection Sustainable Ag Program Project 9223 Final Report. Attachment 3. March, 1993.

"Antiparasite Vaccines." Neil Willetts and Gary Cobon. Chapter 10 in Vaccines for Veterinary Applications. 1993. Edited by A.R. Peters. Butterworth-Heineman, Ltd.

"Grazing to Control Worms." Vaugh Jones. *The New Farm*. Nov/Dec 1993. pp. 52-53.

"The Application of Chinese Herbs in Veterinary Practice." S. Dharmananda, Ph.D. Proceedings of the 15th Annual International Congress on Vet. Acupuncture. 1989. pp. 145-150. [Lists herbs used as antihelmenthics (wormers) in Asia but gives no dosage rates.]

Herd Health and the Environment: Stray Voltage

Stray voltage is one environmental factor that can have a direct, negative impact on dairy herd health.

The definition of stray voltage depends on whom you're asking. The Public Service Commission (PSC) of Wisconsin defines stray voltage as 1 milliampere (mA) of current flowing between two points that can be touched by a cow. If 0.5 volts AC can be measured across a 500 ohm resistor between two points, then the voltage is at the 1 mA level of concern. The 500 ohm resistor is similar to the resistance of a cow's body.

Since the human body has a higher resistance to electricity than the body of a cow, people are much less sensitive to stray voltage. In other words, a cow can get a shock off a water cup from a level of voltage that a dairy farmer cannot feel.

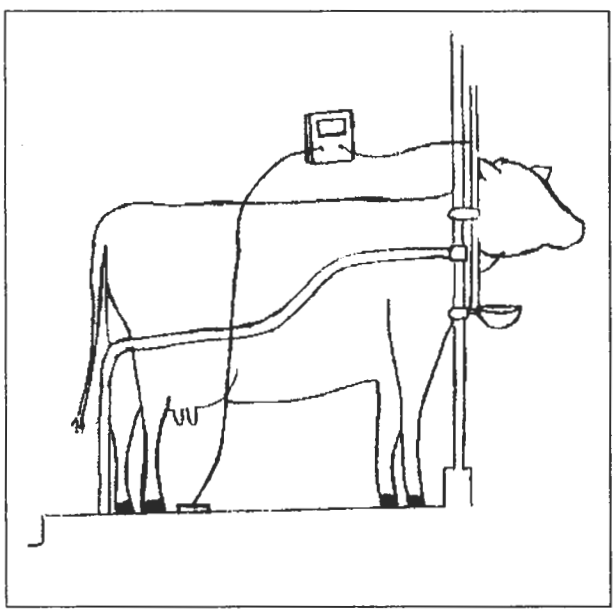


Diagram A.
Differences in electric potential between two points of cow contact can be measured with a 500 ohm shunt resistor.

What causes a water cup to be at a higher electric potential than the floor of the barn? Electricity flowing outside the system is the cause. It's common to think about electricity moving through insulated wires, but electricity may escape "the system" in any number of ways. *A Guide to Identifying Stray Voltage on Your Farm* says, "The causes of stray voltage are often difficult to locate and may differ from farm to farm. Possible sources can be voltages from your own system, your neighbors' systems or your utility's system."

Some people believe that current flowing through the grounding system stresses cows in ways that are not adequately measured by the Public Service Commission definition. For these people, the solution to stray voltage is not to allow any electricity to escape.

The most common electrical distribution system in the United States is a multi-grounded neutral system, which allows current to return to the utility through the earth. Alternative systems of electrical distribution which do not use the grounding system as a normal current carrying path are used in other countries and the state of California, but they are more expensive. Stray voltage consultant Brad Koplin explains, "The delta system that is used in California does not allow current to flow on the grounding system except under a fault condition."

Utility representatives argue that the multi-grounded neutral system was developed for maximum safety from the perspective of preventing shocks from a hot wire, not because it was the most expedient.

Larger Loads

Electrical current returns in a loop to its point of generation. When a motor is run with a generator, the return path is easy to trace. The

return path is more complex with an electric utility's distribution system, but the loop is still made. Electricity flows on all available paths to make its return trip with a greater amount of electricity flowing on the path of least resistance.

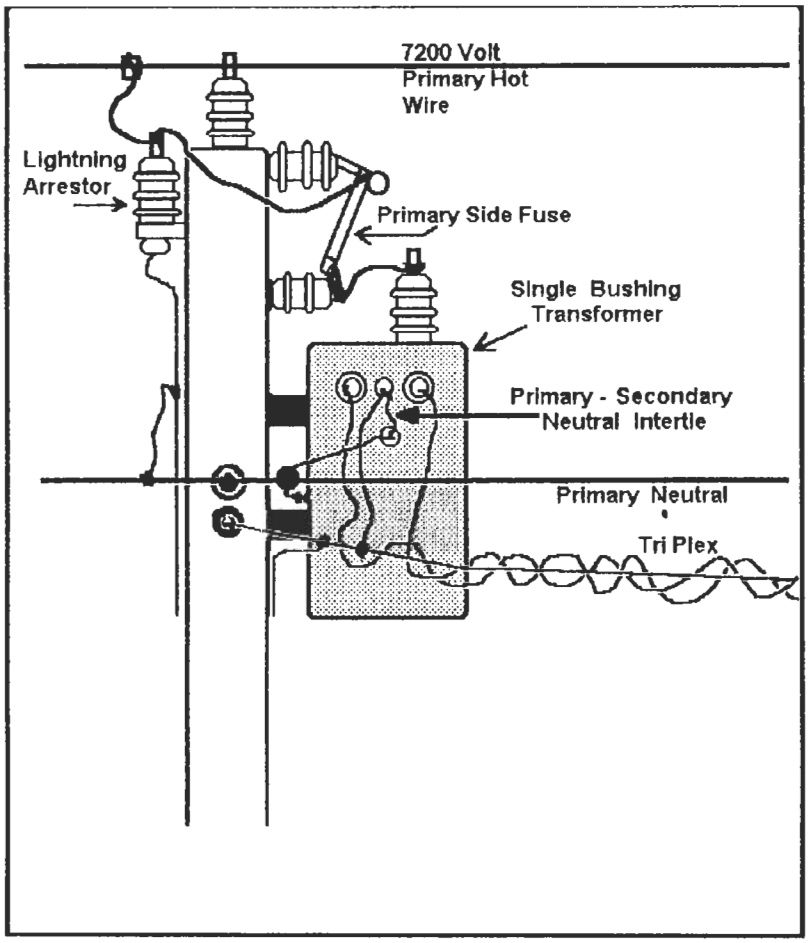
Electrical companies send tremendous amounts of energy to homes, industry, and, of course, dairy barns. Some of the current returns to the substation by the neutral wire, some through the ground. The ground is a possible return path to the substation because of the two-wire configuration of the multi-grounded neutral system. As the consumption of electricity increases in rural areas and farms add more loads, there is a greater amount of current that returns to substations through the earth.

The metal frame work of a building needs to be connected to the farm grounding system both for safety from electrical faults and in order to satisfy the legal building codes. Thus metal stanchion side bars and water pipes, as part of the utility's neutral return path and grounding system, will be carrying current. Finding current on a farm's grounding system is "normal" because the farm's grounding system is connected to the utility's multi-grounded neutral system. This interconnection is made at the distribution transformer and is called the primary-secondary neutral intertie.

While the public utilities acknowledge that current traveling in the grounding system may lead to measurable voltage exceeding 0.5 volts at points of cow contact, they espouse the view

Diagram B

Distribution transformer showing the primary-secondary neutral intertie.



that if the measurable voltage is less than 0.5 volts, the cows should be fine.

Not everyone agrees with this position. Some people define stray voltage problems as adverse cow reactions to electrical activity. Spark Burmaster, an electrical engineer working with stray voltage issues says, "The issue is not the size. The issue is the path. Dairy farmer experience has shown that electrical activity on the grounding system is the chief problem." For people who define stray voltage as electrical energy on the farm grounding system, the measurement focus is finding the paths that electricity has used to escape the insulated wire of the electrical system.

Regardless of whether the "cow contact" definition or the "ground current" definition of stray voltage is applied, farmers (or their neighbors) often associate their stray voltage problems with expanding the barn and adding large electrical loads. The Wisconsin Public Utility Commission recommends that farmers contact their utilities before adding large loads because the utilities may need to increase their capacity.

How is Stray Voltage Detected?

The first signs of stray voltage problems are cow behaviors. Cows that are getting shocked from milking equipment may dance, kick off their milkers, increase defecation and urination during milking, switch their tails, or take longer to milk out. Cows that are being affected when entering or exiting a building may be very reluctant to move or may bolt and run through exits. If stanchions, feeders or water cups are electrically hot, the cows tend to decrease food and water intake. Lapping water is one behavior associated with charged water cups.

The behavioral changes associated with stray voltage have secondary effects, too. Cows with lower food consumption will milk less. If milk let down is incomplete or uneven, problems may develop with increased somatic cell counts, clinical mastitis, and persistent subclinical mastitis.

Spark Burmaster has compiled this list of electrical problems from farmers reporting objectionable voltages:

- High rates of incandescent bulb failure, sometimes in groups. Occasionally a bulb will explode.
- Radio and TV failure. Repairmen think the set was hit by lightning even though it wasn't.
- Accelerated corrosion of well casings and metallic water lines.
- Frequent burn out of submersible well pumps, especially for end-of-the-electric-line farms.
- Numerous electric motor burnouts, especially in batches.
- The farmers also provided a long list of the negative health effects.

When a problem is suspected, a producer may request the local utility, the Public Service Commission, a county extension agent, independent consultants, or an electrician to help with a stray voltage evaluation. The state and utility protocol uses a voltmeter with a 500 ohm resistor shunt attached to various points that cows touch. Electric currents traveling through water pipes, feeders, and stanchions can be highly variable and should be measured over a period of time to test for spikes of current that the herd may experience.

Fixing Stray Voltage Problems

The Wisconsin Department of Agriculture, Trade, and Consumer Protection and the PSC offer these points as potential on farm sources of stray voltage on a three-wire farm system.

1. Loose or corroded neutral or bonding connections.
2. Inadequately bonded metallic equipment.
3. Electric fence wires or faulty equipment shorting directly onto pipes or other equipment.

4. Undersized neutral conductors.
5. Dusty, dirty, corroded, cobwebbed, and damaged electrical connections and devices.
6. Lack of grounding or poor water well connections
7. Missing ground rods.
8. Improperly grounded cow trainer or fencer unit.

Rural utilities will conduct investigations of stray voltage reports on dairy farms. They may recommend changes in wiring switches or more expensive options such as the installation of transition zones and equipotential planes. These solutions are designed to eliminate voltages in areas of cow contact.

Electrical consultants who want to remove voltage and current from the grounding system are more likely to recommend the following:

1. Install a one-to-one isolation transformer (or a spark gap isolator where permitted) to prevent the utility's primary current from flowing onto the farm's grounding system. This also prevents electrical faults from other farms from appearing on the farm grounding system. A Wisconsin public utility can also install a solid-state isolator, but the PSCW regulations stipulates a 90 day maximum time allotment for such an isolator to be in place. Farmers installing their own isolation transformers are allowed to leave them in place permanently.
2. Install a true four-wire system throughout the farm. In this system the neutral and ground wire do not touch each other after the beginning of service to the farm. Find and correct any wiring errors. This step eliminates any farm generated secondary current from flowing on the farm grounding system.
3. Fix electrical design flaws and wiring errors in electrical equipment or appliances that put current on the grounding system.

Spark Burmaster says, "I talked to an electrical engineer from England who expressed amazement that we were intentionally using the grounding system to return current. In Europe, if you find current on a residential or farm grounding system it is viewed as a problem to be addressed. In the US., current on a residential grounding system is defined as 'normal.' What we are advocating is that we objectively look at the electrical distribution system to determine if it adequately meets the present and future needs. 'Needs' are broadly defined in terms of both energy use and environmental issues. We don't know the exact biological mechanisms, all we know is that we've seen positive biological results from the removal of the voltage and current from the grounding systems."

Why Can't We Agree—Farm Studies, Case Studies, Replicated Research

Farm surveys have documented that stray voltage can lower milk production. R. D. Appleman, R. J. Gustafson, and T. M. Brennan worked in cooperation with a privately owned utility and four rural electric cooperatives to identify 394 farms that had isolation transformers installed prior to August 1986. Out of those farms, 121 farms had DHIA records for milk production for two years prior to isolation and one year following isolation. The researchers analyzed these numbers and found that rolling herd averages (RHA) did improve after isolation. However, 84 farms simply improved at the same rate as all the other DHIA farms in the region. The milk production of the remaining 37 herds (31% of the farms) showed a high response to electrical isolation, which averaged seven pounds more milk per cow daily.

Dairy cow responses to electrical stimulus have been studied by several research teams. A cow cannot tell a scientist when she feels an electric current, so the effects of current are studied by recording cow behaviors. From a review of several studies, D. J. Aneshansley and R. C. Gorewit (1991) concluded that 3 to 6 mA of current is needed to produce moderate

behavioral responses. Some cows are more sensitive than others and may begin to lift their legs more frequently, urinate more frequently, or swish their tails from an electrical stimulus as low as 0.5 volts. The PSC definition of stray voltage is derived from the low end of the spectrum of cow responses to electrical stimulus.

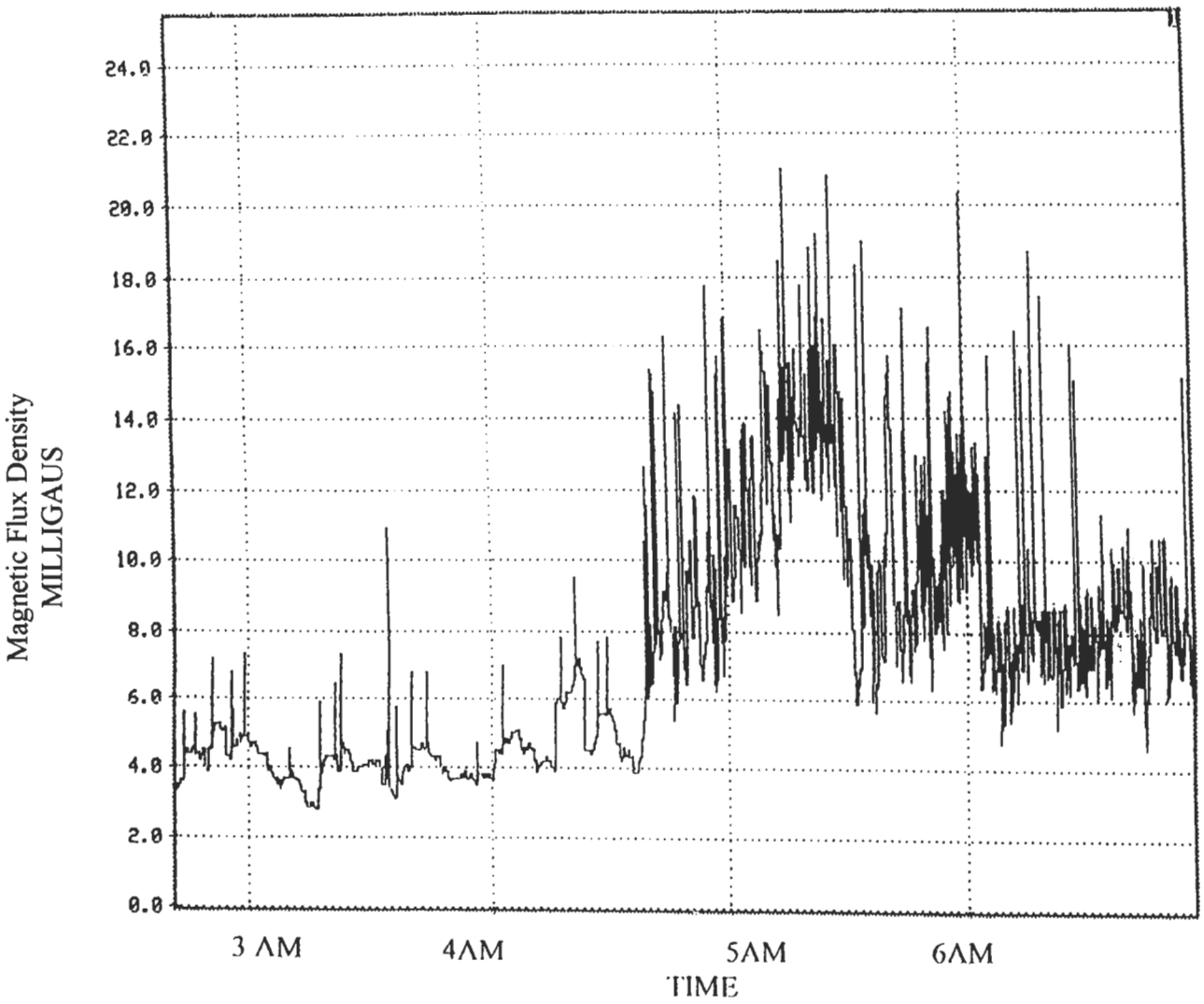
The effects of electromagnetic fields, as opposed to current flowing through the cow, is still being researched for negative health effects. Electric flow naturally produces a magnetic field that is proportional to the amount of current being conducted. The strength of a magnetic field is commonly measured in units of Gauss or milliGauss.

Doug Reinemann at the University of Wisconsin has completed an experiment exposing early to mid-lactation cows to magnetic fields of .4 to 4000 milliGauss for ten to 15 minutes. The experiment tracked six different behaviors, but Reinemann was not successful in measuring any cow reaction or sensitivity. Reinemann will soon begin to measure the effects of seven-week-long exposure to different magnetic fields.

Until experiments like this are completed, it is not easy to explain the on-farm observations of people like Tom Beane. As an experienced dairy farmer trained in farm equipment service, Beane has been a consultant for dairy farms experiencing stray voltage problems. Beane has worked with several farms that have installed equipotential planes, but still have problems they associate with objectionable current. A properly installed equipotential plane will minimize differences in electric potential between cow contact surfaces in a barn, but will not eliminate current on the farm's grounding system. On one particular farm, stray voltage had been mitigated with the installation of a four-wire system and an equipotential plane, but Beane could measure 900 mA of current on the grounding system with current clamps and an ammeter. Milk production on the farm increased dramatically when this "ground system current" was eliminated by installing an isolation transformer. Beane has concluded that electrical isolation and taking current off the grounding system are necessary to mitigate electrical concerns on dairy farms.

Change in values of management parameters for the upper 31 percent of herds ranked according to percentage increase in RHA milk production after isolation. (Source: Appleman, et al. 1987)

Parameter	One year before isolation	One year after isolation
Annual milk/cow	14,687[a]	16,444[b]
Herd Size	50.0	53.5
Cows leaving herd	35.6%	37.6%
Somatic cell count	408,300	340,000
Milk production was the only parameter that showed a statistically significant difference. [a,b] Means within a row differ ($P < 0.05$) when superscripts differ.		



Spark Burmaster: "This graph is a representative depiction of actual current flow on a grounding system of a rural residence showing its highly erratic nature. A magnetic sensor was placed next to the neutral wire coming into the farm with no on-farm electrical loads. It is a measure of what's coming in from the power line. The amplitude is not the issue. It's erratic nature is the issue."

Additional Resources

Production record analysis of dairy herd response to neutral isolation. R. D., Appleman, R. J. Gustafson, and T. M. Brennan. 1987. Number 87-3039. American Society of Agricultural Engineers. St. Joseph, MI 49085.

A Guide to Identifying Stray Voltage on Your Farm. Oct. 1990. Wisconsin Dept. of Agriculture, Trade, and Consumer Protection. Madison, WI 53708.

Section 3: *Physiological and Behavioral Effects,* Daniel J. Aneshansley and R. C. Gorewit. 'Effects of Electrical Voltage/Current on Farm Animals,' 1991 USDA/ARS Agricultural Handbook Number 696. Three volumes with an extensive bibliography. [The ARS has no additional free copies, but they can be purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.]

Straight Answers To Your Questions About Stray Voltage. Wisconsin Power & Light. PAM 367 CC7-91-10M.

23 Farm Study. Tom Beane. 7 pages.
Mr. Beane's address is:
N3540 Hwy G
Fort Aktinson, WI 53538
Tel. (414) 563-3151

"Electro Pollution" pp. 35-45 of How to Keep the Milk and Money Flowing subtitled The Ultimate Troubleshooting Guide for the Dairy Farm. Bob Scott, DVM. $22 each.
Available through the author at:
1120 Lois Court
Shoreview, MN 55126
Tel. (612) 481-0372

People Resources

- Wisconsin Dept. of Agriculture, Trade & consumer Protection's Stray Voltage Analysis Team. Call (800) 942-2472 for an application.

- Public Service Commission of Wisconsin at (608) 267-7968.

- Home-Business-Farm Environmental Options
  Spark Burmaster
  Rt. 1 Box 77A
  Chaseburg, WI 54621
  Tel. (608) 483-2604

- Daryl Aden
  Farm Animal Specialist
  Blue River, WI 53518
  Tel. (608) 537-2053

- Brad Koplin
  RR 1 Box 57A
  Westfield, WI 53964
  Tel. (608) 296-3113

- Your County Extension Agent.

- Your Electric Utility.

- Farmer's Assistance Hotline
  Telephone: (800) 942-2474.