Ideal Manure Odor-Fly Prevention at Livestock Shelters:
Engaging the Farm's Ecological Advantage

by James C. Silverthorne

Across North America, summer begins with numerous annoying flies at livestock shelter areas. Bzz bzz … (swat*!*) Bzz ….

At last summer's end, we knew what this summer's fly season would be like — just about the same if we make no changes. Now is the right time to modify fly prevention programs with this natural linkage in mind: Both manure odors and fly populations are at their highest levels during summer's warmth.

During summer in livestock shelter areas, with even small accumulations of fresh and decaying manure, the odor-fly relationship is causative as manure and urine odors attract some types of flies to the odor generating material. Corollaries to this dynamic: Manure not producing such odors and other volatiles does not attract flies to itself; Fresh air -- free of manure odors and other volatiles -- does not attract flies.

Those points comprise this article's message; the rest is a sort of entertainment in three parts: (1) An assemblage of generalities on the ideal protocol to prevent odors and flies. (2) A history of specific experiences from which I developed the generalities. (3) Profiles of four livestock farms working with the particular demands of their operations.

Natural Feeding:
Unconfined grazing animals staying in one area "too long" increase the area's production of manure and urine odors/volatiles which attract too many pest flies. Because of the increasing pest level as well as the decreasing amount of forage, animals move on to taller grass, fresher air, and fewer flies. Moving on can also avoid local predator attacks.

IDEAL, AS IMAGINED
Can an ideal manure management-fly prevention program for livestock shelter areas exist in farm practice? As we may imagine it, the ideal program results in a livestock shelter area (barn, stables, loafing shed) so free of flies, full of fresh air, and chemically safe that one could comfortably picnic there with family and friends.

Our image of ideal success — the livestock shelter as picnic zone — guides us to its establishment in the real world.

Inspiration for this format comes from the non-fiction writer Henry David Thoreau, an American original who wrote in the mid-1800s. A keen and philosophical observer of nature, he had an educated propensity to writing about it. He often related to nature with a ruralist's affable practicality. In the Conclusion of his most well-known work, *Walden*,

Thoreau advised, “If you have built castles in the air, your work need not be lost; that is where they should be. Now put the foundations under them”.

What are the most effective foundational materials and methods that establish the ideal manure odor-fly prevention program, our “castle-in-air” picnic zone?

REAL FOUNDATIONS

They are: (1) a cluster of standard low-risk fly-prevention tools to decrease an existing fly population. Several weak items working together can support each other’s actions; (2) an emphasis on decreasing levels of airborne fly-attractants typical in livestock areas (the often odorous volatiles produced by manure, urine, decaying bedding material, and spoiled hay & feeds), thereby preventing fly population increase and usually ensuring its decrease. Decreased concentration levels of fly-attractant volatiles also make the program easier to accomplish by decreasing the need for the prevention items in (1). Further, with consistently very low levels of manure’s attractant volatiles, area fly traps’ attractant baits become relatively more effective.

Combined, these foundation elements can produce an efficiently effective program having a much higher total value of output benefits than its input effort/cost.

EFFICIENCY OF THE ECOLOGICAL ADVANTAGE

Prevention of manure odor production yields direct and indirect effects. Fresh air is a direct effect. Indirect effects may be many, exemplifying a farm’s *ecological advantage* (EA). I introduce here my novel use of the term to signify a farm eco-system’s amplification of the value of an input’s direct effect — amplification evidenced by proliferation of indirect effects accomplished by farm components’ interactivity. These connections provide the advantage.

The more interactive are a farm’s bio-chemical components, the more numerous are the possible beneficial indirect effects of an input action, the greater is the efficiency of the farm’s EA. The extent of interactivity determines a particular farm’s EA efficiency rate (low, medium, high): feed/forage-animal-manure-compost-soil-plant-feed/forage.

The output total value of combined direct and indirect effects can greatly exceed input costs on a farm with a high EA efficiency rate. An accounting of protein/nitrogen changes can exemplify how the EA functions with its bio-enhancement events occurring at different times and locales on a farm (more study needed).

An EA is most available in well-functioning, complex, semi-closed biological systems such as today’s sustainable farms. Their robust efficiencies of EA make them biologically, environmentally, and likely financially sustainable.

For fresh air to be a fully successful fly prevention material-method, odor concentration levels at manured areas need be almost imperceptible to human olfaction. Maintaining this status is not usually difficult but does require attentive management, itself typically integral to sustainable farming.

Some Benefits of Fresh Air at livestock shelters:

- Increased air freshness/purity of air = decreased threat to animal & human health
- Decreased ammonia gas emission (N loss from manure/urine & its compost)
- Decreased emission of hydrogen sulfide, skatoles
- Possible decreased emission of carbon-dioxide, methane, nitrous-oxide
- Improved soil structure/fertility from compost = improved grass/crop growth = promotes/supports herd health
- Decreased fly-attractant volatiles including odors = decreased local pest fly population = decreased volume insecticide application = decreased toxicity threat
- Decreased fly population = increased animal health + decreased required amount of maintenance feed
- Decreased fly population = decreased manure N loss by fly larval consumption of manure N
- Decreased liability of governmental regulatory violations
- Increased good-neighbor relations

Materials & Methods (biocompatible) for prevention of manure odor production at livestock shelter areas:

- Air dispersal, active and/or passive
- Removal of manure to a location150+ feet distant from livestock shelter
- Absorbent bedding materials, including finished compost; a dry surface does not evaporate moisture carrying its odor components
- Minerals: natural compound powders
- Biological: bacterial, enzyme solutions; plant derivatives; dung beetles

MANURE ODORS ATTRACT FLIES

Manure odors attract flies (MO-AF), a natural dynamic. Managers will be happy to learn that establishing fresh air at livestock shelter areas is the single most effective safe method *and* material for decreasing the local fly population, as I and others have found. Air free of fly attractants makes an associated fly prevention program more efficient. If that be doubted, consider the aggravations certain to arise with increased fly attractant concentration levels.

Insects have their important missions which allow very little vacation travel. To conserve energy, they need to arrive not just randomly anywhere, but rather where their chances are greatest for food and reproduction.

Importantly, flies will not develop genetic resistance, or become desensitized, to the absence of odorous attractants — otherwise known as fresh air. For flies, certain odors and other volatiles (other than pheromones) comprise the attractant signal. Fresh air, containing no such signal, is background “noise.”

During fly season at most livestock shelters throughout the United States, a continuous absence of manure-generated fly attractants can greatly decrease the otherwise needed applications of fly-insecticidal agents (NASS data at USDA appear to indicate 200 tons per year, plus or minus 25 percent; more study needed). As much as 80 percent of that amount (see anecdotal example ahead; more study needed) may be eliminated by preventing production of fly-attractant manure odors. Areas largely free of attractant odors have fewer flies meaning fewer targets and less need for insecticide application which leads to lower insecticide volume applied resulting in lowered toxicity threats to the farm's human, animal, and nearby wildlife populations (particularly birds), with lowered costs for the farm.

Most Briefly:
Problem: Ecological managers of livestock shelter areas are often challenged to efficiently achieve adequate prevention of pest flies (most insecticides being excluded). Costs and work time for pest fly prevention can be unnecessarily large.
Why this happens: Managers are often unaware that manure-generated odors & volatiles, even at only moderate levels, can attract large numbers of some types of flies. These flies remain and reproduce in the odorously attractive locale; next generations remain and reproduce while manure's natural nitrogen is lost to the atmosphere.
Solution: Organizations advocating ecological management of livestock need to publicize the MO-AF dynamic. With increased awareness that flies are widely attracted to shelter areas by manure *odors*, managers will attentively decrease the odor levels.

A SIMPLE OVERSIGHT?
Why don't we hear more (or anything) about the MO-AF dynamic and how to prevent production of manure odors? Haven't these groups,

> university livestock departments, EPA's Office of Pesticide Programs (OPP), states' pesticide divisions, livestock trade publications, general agriculture's news journals, all types of agricultural advocacy, environmental advocacy, UN-FAO, USDA-ARS, USDA-NOP, organic certifying organizations,

had good reason to publish the fly-attracting property of manure odors and also some of the biocompatible materials and methods which can prevent attractant odors' production? Yes, they have. Yet, for more than half a century they have rarely done so.

Validity of the attraction dynamic as presented here is not in question. Entomologists have long established that flies' detection of airborne chemical compounds is their primary method to select and arrive at their preferred destination. Flies, and other insects and organisms, travel the plume of an appealing scent upwind along a path of increasing concentration level to its generation source.

Both farmers and non-farmers alike are usually astonished to learn of the absence of presentation and discussion of the MO-AF topic, given that the above groups' shared mission is development and communication of efficiently helpful practices to the farming

public. While these groups have been seemingly oblivious of the topic, it's also fair to note that livestock managers themselves have not identified it, or not with any urgency. I was once witless like that. Unlike government and academic employees, livestock managers making the MO-AF linkage would have found it personally as well as professionally rewarding. What can explain the long silence from so many groups, each with its strong interest in efficient prevention of pest flies at livestock shelter areas? I have yet to discover the cause(s) of that collective stupor.

Sometime, livestock managers wanting greater efficiency will require identification and prevention of distinct pest attractants in their pest prevention programs. When they do, the MO-AF topic will be diligently investigated rather than ignored.

Internet searches for pest fly control yield many worthwhile advisory sites. But, of the ones I've reviewed from 1998 to date, almost none identified manure odors as fly attractants. Only recently do several sites speak MO-AF. Other sites describing research of manure odor/volatile production and its chemical composition rarely mention its fly-attractant property. This article may help to remedy the oversight.

ALSO NOT STATING MO-AF

Normally, sellers of manure odor production prevention (MOPP) products would clearly state the MO-AF dynamic in their advertisements, brochures, and labels. Normally, advertisements proclaim every benefit of a product's use. But, for this product type, normal has not been allowed. Since c.1971, its sellers have been prohibited by EPA-OPP from stating "manure odors attract flies" unless the product went through the registration process to become an EPA pesticide then allowed for sale.

EPA Pesticide-Speak:

With very few exceptions, EPA legally defines any *commercial* product as a pesticide product when the product claims in label and/or advertisement to do any of the following actions to a pest population: "… prevent, destroy, repel, or mitigate" (FIFRA, 40 CFR 152.3). The product sold with such a claim is legally required to be registered as a pesticide with EPA-OPP.

However benign a product's ingredients, OPP has long found that the MO-AF phrase itself (an implication of an indirect effect) caused the product to become an EPA pesticide. Reasonably, sellers have not taken on the burdensome registration process, more appropriate for toxic ingredient products, just to state MO-AF in sales literature.

That's why MOPP products advertising their odor abatement features have not stated odor prevention's likely indirect effect of fewer flies on and near the treated manured area. This exclusion is not an oversight, but rather a direct effect of EPA's longtime interpretation of pesticide law.

However, those of us who do not sell or distribute such products have never been legally silenced by EPA. We may continue to speak of manure odor's fly-attractant

property in detail, even go on and on about it as I do. Doing so, we achieve near perfect justice in an amicable, Thoreauvian manner.

NOW, NEW TIMES

My recent check with EPA-OPP on present status of its MO-AF phrase policy, described above, yielded a surprising and welcome development. No longer does a MO-AF statement accompanying a MOPP product *necessarily* cause the product to become an EPA pesticide. Now, with some OPP review and guidance, the product with such statement might not be seen by OPP as an EPA pesticide and thus not require EPA-OPP registration for its sale.

As I understand from communication with Catherine Milbourn, Press Officer at EPA HQ Media Office, each likely seller of a MOPP product desiring to include the former troublesome phrase or its equivalent should request an OPP review of the product for official determination of being an EPA pesticide or not. To begin an OPP review of a manure odor production preventing product with all its proposed descriptors (label, ads, images) contact EPA-OPP Ombudsperson Nicole Berckes: 703-308-0152 and/or <berckes.nicole@epa.gov>

Also, check in with your state's pesticide division. States differ in willingness to impose constraints on commercial availability of relatively benign agents. A state might make certain demands even on a product OPP has determined is not a pesticide.

A governmental regulatory enforcement entity, or commercial competitor, may employ entrapment methods to assess a MOPP product seller's full compliance with FIFRA and state regulations. So, a MOPP product seller needs to know all the rules before a "customer" asks about pest fly riddance, prevention, mitigation, etc. Claims or images of these actions will cause the product to be seen as an EPA pesticide.

HEALTHY POTENTIAL

Our central topic itself is not breaking news. Manure volatiles/gasses/odors attract flies to their source material, and air without these volatiles does not — the statement is accepted as true as soon as it's heard. Here's the grand surprise: It's little discussed and rarely acted on by livestock managers. The longtime neglect of this natural dynamic by professional parties continues today. Almost everywhere its great value to sensible livestock management is unrecognized, ignored, or deliberately silenced. Pest attractant mitigation needs to be investigated further and developed to its fullest practical benefit for farm families and their animals, worldwide. We may imagine that healthy future.

The author thanks holistic, farm animal veterinarians C. Edgar Sheaffer VMD <www.clarkvetclinic.com/home.html> and Joyce Harman DVM, MRCVS <harmanyequine.com> for their encouragement of his investigations regarding manure odors as fly attractants at livestock shelter areas.

HUMBLING TIMES

Even after thirty years of working with diligent livestock managers, lots of animals, often smelling plenty of manure odor and seeing lots of flies, I had not figured out the dynamic

in front of my nose and eyes. Nor had I known of any manager, veterinarian, or university specialist identifying a barnyard's odor as a large area fly attractant or fresh air as a fly prevention method. I never heard, "It's the odor here that keeps the flies here". Then, with uncommon good fortune, I chanced to relate a manured area's odor production to the local fly population, the MO-AF dynamic.

Humans sense most of manure's odorous attractant volatiles as malodors. But, flies at and near livestock shelters appreciate such volatiles as charming invitations to visit their source and stay there, forever it can seem. I discovered that some biocompatible materials and methods can decrease and almost eliminate fresh and decaying manure's capacity to produce odor, ending the warm weather flow of invitations.

GRACEFUL STUMBLING

At a biological agriculture seminar given in 1981 by Carey Reams and Dan Skow DVM, which I saw advertised in *Acres U.S.A.*, I learned of a natural mineral compound's capacity to decrease a manured area's fly presence. During that mid-spring in Minnesota, Reams told us that soft rock phosphate (SRP), also termed colloidal phosphate, dusted onto manure can prevent most of a local pest fly presence.

I had come to the seminar with that very concern about my horse stable management. I needed an effective, non-toxic, easy to use way or agent to greatly decrease pest fly population in the stables building and its barnyard. Therefore, I listened intently to Reams tell our group of farmers something like, "So that flies will not be a problem in the chicken houses, just dust SRP onto the surface of accumulated manure. No need at all for toxic fly control agents."

Reams had commented on fly riddance and prevention around poultry manure in chicken houses as an afterthought on a side issue. He did not say *how* SRP rids a manured area of flies. He did not mention that SRP abates manure's odor production, nor did he say how frequently to apply it. Yet, I thought that SRP was made for my stables — I had lots of manure to spread it on and lots of flies to get rid of. I had "stumbled" into the right place at the right time and was willing to listen.

FANATIC FOR FRESH AIR

Returning to my farm, I soon obtained and dusted SRP onto the stinking, unbedded manure packs in the sheltered loafing areas and outside barnyard. Being late spring, the area already had lots of flies. Within fewer than three minutes after application, odor production stopped. At first, I didn't know that production had stopped. I had not expected it. I had only expected the fly presence to decrease, somehow, somewhat, sometime. Then, I became certain that I no longer smelled the previously constant malodor. I walked around on the treated manure pack. The air over this manured area had become cleaner, actually fresh. It stayed fresh. I realized that the entire manure pack had stopped its gassing of odorous volatiles. Previously, I would not have imagined that possibility.

Standing in the midst of the mystery that early afternoon, I soon understood that the newly odor-free, fresh air would attract no flies. That was the bio-mechanism, not indicated at the seminar, of Reams' fly prevention method.

I knew that because I had earlier read USDA entomologist researcher Philip S. Callahan's *Tuning into Nature* (1976) and his later articles in *Acres U.S.A.* on insect detection capabilities of certain signals. From Callahan's writings on insect attractants and Reams' confident assurance of fly riddance, I perceived that the anticipated effect (fewer flies) would most likely be caused by the greatly lowered concentration level of attractant odors produced from the treated manure.

The effect of fewer flies relies on their keen detection of manure odor to guide them to its source – that being critically important to their survival and reproduction. Where the signal is almost absent, little or no attraction to a viable residence (manure) can occur.

FRESH AIR'S FIRST INDIRECT RESULT

The manure's odor production, as detectable by olfaction, dropped by an estimated 90+ percent of the previously produced fly-attractant gasses. The pest fly population dropped by an estimated minimum 80 percent of its previous average level. As reported to me, similar large changes have been confirmed by managers in other locations.

I have focused on SRP (most often applied to crop soil) because it was the first material I used. Years later, I observed and heard that other equally effective, biocompatible odor production abatement agents also yield similarly decreased populations of flies at previously odorous sites.

A few days after the first application of SRP, I called on the farm's friends – those lucky people -- to come witness the new absence of manure stench. They also observed the decreased fly population. This time, their cars parked with open windows near the stables did not fill up with flies.

STEALTH MODE

Not producing attractants, the treated areas were then in stealth mode to flies' detection capability of preferred home-site. The two odor-free manure packs (totaling 1,400 sq. ft.) and barnyard (1,000 sq. ft.) of fresh and decaying manure and urine had seemingly become "hidden" to flies, producing no pertinent signal for them, having been blurred into the general scenery.

Given such welcome results at my stables, I did wonder why odor prevention for fly prevention was not well known at all livestock operations. I still wonder.

VOLUNTARY CROWD DISPERSAL

In the wild, flies usually have a selection of differing concentration levels of attractant odors. Flies are typically more attracted to the source of the higher concentration level of appealing volatile/signal.

I presumed — an indication of more study needed — that the flies which left the treated area had become attracted to natural production sources of volatiles in nearby woods and wetland areas. Those areas had just become the stronger generators of attractants relative to the now odor-free areas of SRP-treated horse manure and urine.

HOW BAD WAS IT?

Prior to first applying SRP at my stables, I had accomplished very few pest fly prevention measures other than hanging sticky paper and spreading soft wood shavings onto the manure packs' high moisture spots.

By my lack of adequate action, I maintained an often stinking shelter area full of flies. Even though the horses were out to pastures from evening to early morning, I was much concerned with the situation. Wouldn't some exposure to insecticides (by periodic premise fogging) be less stressful to the horses than all the flies? But, the situation of much odor production and many flies unexpectedly turned out to be a best-ever historic control (before & after) for that first SRP application experiment.

SRP AND ME

To maintain the newly decreased fly population level, all heavily manured areas needed treatment to prevent odor production. Mid-summer times, northeast Pennsylvania, I found that 40 pounds of SRP sufficed at 5-6 day intervals to properly treat by a light dusting about 1,400 square feet of indoor, unbedded manure pack (1.5+ feet deep) freshly increased daily by 10 horses. About 100 pounds of SRP were required per horse per odor-fly season.

During spring and fall, applications were required only once every two or more weeks. Successive applications were made on an as needed basis, determined by the return of a slightly detectable (human olfaction) presence of manure/urine odors, particularly that of ammonia.

Some suppliers of SRP for prevention of odor production from sheltered, bedded areas, suggest applying amounts averaging only 2 ounces per day (less than one quarter cup volume) for an 800-pound animal, or 45 lbs/year. Spot treatments can also be made with other natural minerals, bacteria-enzyme solutions, and the farm's own well-decayed compost.

Because I almost always kept the horses at liberty, the dirt-based barnyard between the two shelters was also heavily manured. Effective SRP treatment for that area worked out at about one-quarter the frequency of the indoor loafing area manure packs.

Application of the mineral powder by dusting from a grain scoop to the surface of the manure packs required 10 minutes, maximum. Applied to fresh manure, as some managers do in dairy barn gutters or on loafing areas as I have done, it rapidly prevents odor production. Treated manure's absence of odor production continues later in the compost heap. Containing approximately 20 percent each of phosphate and calcium, SRP added to manure increases the manure's fertility. When heaped for composting,

treated manure's decay processes appeared to be normal, except for absence of odor production. Much of the manure's native protein/nitrogen component is thereby presumably retained within the heap (more study needed) as feedstock for beneficial microbes and worms until the compost is added to crop or pasture soil.

Advisories for applying SRP: (1) always wear appropriate dust mask to prevent inhalation of the fine particles, (2) wear appropriate eye protection to prevent irritation. When spreading onto land SRP-treated manure, or any manure/compost, avoid locales near waterways into which rains may cause runoffs of manure/compost. The less additional phosphate and nitrogen in waterways, the better.

FAKE BARNYARD MANURE?

We are entirely accustomed to seeing manure and at the same time smelling its odors (warm weather) that on first observing non-odorous raw manure, the scene can shockingly appear to be un-real. I once invited an acquaintance who worked in film-making to visit my fresh-air stables during a hot summer's day. John had grown up on his parents' cow-calf ranch in Kansas. Like most livestock people, he knew about manure odor and flies – but as unrelated events.

At my stables, I had been treating the manured areas with several biocompatible odor-preventing agents. Other than the grassy smell of the horses themselves, fresh air was the only aroma we detected. John exclaimed, "It's like looking at a film stage with the manure as just painted fiberglass props on the set. Without its usual odor, without any smell — that manure pack I'm looking at here — it doesn't seem real!"

I told him about my treatments preventing manure odor production. Then he asked, "What do you do about the flies? There're very few flies around here." It wasn't an accusation, but he did sound mystified because I had told him I kept the stables free of toxins. Pointing to some of the stable's five guinea fowl prowling a shady inside edge of a loafing area, I said, "Small brain but huge obsession – they live to hunt flies and their larvae." Then I told him about the elephant in the barnyard: Fresh air, free of attractant manure volatiles, attracts no flies (only a few). He was astounded, "That's it? It's that simple?"

More than a cosmetic nicety, fresh air does not attract flies -- that's the core of all efficient fly prevention programs. It's particularly valuable for those relying on weak, low-risk insecticidal agents. Other items in a program are add-ons, important to be sure, yet secondary to keeping the strongest "scent" around livestock shelter areas that of fresh air.

FOWL FEED'S GOURMET PROTEIN

Barn swallows, wasps, and bats patrolled the airways. On the ground, well-known for their keen, unending appetite for high-protein insects, guinea fowl accessing manured areas assiduously hunted both ground-traveling adult pest insects and their slightly buried maggots. The stable fly population was lowest at my stables when I not only

prevented manure odor production but also allowed five or so guineas to police at will a total of 2,400 square feet of heavily manured area.

LOOKING FOR FRESH-AIR TERRITORY? ASK DIRECTIONS

How to determine which products and methods will work best for your operation? Ask people who have the same animal species and/or similar farm type. Organizations dedicated to ecological farming would be the most up to date on the topic. Perhaps your region's organic certifying organization advises on this topic (fly-attractant mitigators other than repellents) in its guidelines for approved pest prevention. Prevention of pest attractants is essential to any efficiently successful IPM program. So, inquire of your local ag-extension personnel.

IN THE ORDINARY BARNYARD

Does this article over-think manure odor? Not at all. Relative to the entire scope of manure odor production and its prevention, it is but a brief telegram on the subject. The subject's rich complexity merits more development than my workaday reporting provides.

We see that many of society's endeavors and concerns meet in the ordinary barnyard:

> the sciences and applications of bio-chemistry, entomology, livestock health, environment, public health, atmosphere, climate; mismatch of intentions and consequences of some governmental regulations; university interdepartmental communication and research choices; strictures on new product entry to market; observing nature and maybe learn or learn anew; our casual acceptance of informal external authority; willingness to form and ask questions; ethical diffusion of knowledge; business efficiency in gaining more (farm system benefits) from less (land, material, labor, money, time); pest mitigation methods; toxic threats to the farm's biology; fertility of compost and soil; crop health.

All this from Carey Reams' chance comment made thirty-three years ago.

Special thanks for their patient assistance to the reference librarians at the Eastern Monroe County Public Library, Stroudsburg PA. The library subscribes to Acres U.S.A.

HAPPENING NOW

Each of the farms described here deserves its own full section, but our narrowed focus is on its particular manure odor and fly management program.

Cranberry Creek Farm
http://cranberrycreekfarm.com/

Jeffrey and Mary-Jean Henry began dairy goating 2007, near Cresco PA, with 5 Nubians, built the herd to 60 does, recently sold all to develop the new herd of greater milk production genetics now with 18+ registered Alpine does and aiming for a total of 40 milkers. With the smaller herd, he has more time to establish his desired management improvements. The farm retails all the chevre, skyr, yogurt, kefir, and

aged cheeses it can make. Jeff attributes the products' widely-noted appealing flavors in part to the herd's sometime browsing on 80+ acres of the farm's forest. In one of the farm's newsletters, Jeff cheerfully wrote, "Drinking our goats' milk, you drink the forest!"

When not woodland browsing, the herd is fed and housed in an high-roofed, fully ventilated shelter bedded with chopped straw. The two concrete floored loafing area pens were designed for ease of manure-bedding pack removal with a front end loader machine.

Focus By late summer 2013, Jeff began to periodically dust the goat pen's soiled wheat straw bedding with soft rock phosphate, at the rate of about 25 lbs SRP to 900 square feet. With the first SRP application, Jeff observed that the manure and urine odor levels decreased greatly. The very low to undetectable levels continued for about 7 days, then slightly increased. He has noticed many fewer flies, particularly the house or filth fly. However, although lower than before, a greater than acceptable number of stable flies, a biting type, remained.

Comment When I last visited the farm in late August 2013, temperature of 73 degrees F., I deliberately left my parked car's windows open. I whiled a pleasant hour and half at the goat barn interrogating Jeff on his procedures past and present to adequately manage, or not, manure odors and pest flies. During that time, I noted low concentration levels of both odor and flies. Returning to the car, I was surprised by how few flies were inside, counting only seven. In summers past, while visiting at the farm's then somewhat smelly goat pens, an almost unbearable quantity of flies would fill the open-windowed car (same car, same parking location, similar weather).

Future Jeff considers making a quick application by sponge of a dilute herbal repellent to the goats' lower legs at milking times. A for-sure adjustment will be increasing the distance from the barn of the compost windrows of spent bedding/manure from only 50 feet to at least 150 feet. Currently located so close to the barn, the decaying materials could be the local "factory farm" for stable flies. At this writing, most of that material came from manure and litter not treated with SRP. With the SRP prevention of odor production, he estimates that manure and bedding removal can be done at two-week or longer intervals. Local ag extension personnel will definitely advise him to place pheromone traps and fly-predator wasp eggs close to the compost windrows.

Lazy Lady Farm
http://lazyladyfarm.com/

Laini Fondiller began her northern Vermont dairy goat farm in 1989 with four goats. Now she breeds and sells registered Alpines, milking 40 goats. She makes and sells cheeses of legendary quality. During the early 1980s, she had apprenticed at various livestock farms. For two of those years she was a *stagiaire* (apprentice) at farms throughout France. There, she first learned about intensive rotational grazing. She did a lot of underpaid or not paid at all work in order to learn from other people's successes

and failures. A failure item, in her eyes, was their non-ecological fly control. She has changed all that at her farm.

Focus The farm developed a successful manure and fly management program, virtually eliminating pest fly aggravations around the animal shelter area. LLF has been profiled in national publications, but this time, it's about the flies, or rather how the few that show up get gone.

Lazy Lady Farm's basic fly control program:

> (1) Obtain adequate quantity of required supplies of preferred sticky trapping material ahead of the season.
> (2) Start early!
> (3) Important: "Know the fly" -- observe flies' habits, resting areas to ensure "strategic" placement of the sticky material.
> (3-a) If not catching many flies, adjust sticky ribbons' locations and/or change brands to the needs of your operation.
> (4) Remove manured bedding completely twice a week. Get into corners with a hoe; remove all spilled feed.
> (5) Move spent bedding + manure to a location distant from the animal shelter. Turn the heaps twice in summer.

The sticky traps she favors are the reel type and the "curtain" type. She will place a 4'-5' section of the curtain material directly in sunlit areas on cleaned floors where flies often land. Same reasoning for their placement across windows with morning sunlight. Laini emphasizes that success with her program requires continuing attention to the particular setting in which it's applied. Observe your flies in your barn – learn their habitual resting places because those are the high-yield places to position the sticky ribbon traps. For example, Laini saw that indoor flies at night "roost" high up from the floor. Accordingly, she places reel type sticky ribbon at or near the ceiling for the entire length of the enclosed area.

Comment The goats are not bothered by the remaining low population level of flies. She, her goats, the nearby bird population, and her farm's natural locale are not subject to insecticidal toxins. She says a parked car with open windows near the animal shelter area nowadays collects no flies. That's a test result that every livestock manager understands.

Future Laini says it took her a long time with many adjustments to develop her program that now works so well. She wants other managers to know that success is possible.

Tussock Sedge Farm
http://tussocksedgefarm.com/

Henry and Charlotte Rosenberger began their cow-calf beef farm in 1990, having about 550 acres in several tracts near the village of Blooming Glen PA. They manage their all

grass-fed herd (total about 300) without the conventional inputs of typical beef cattle operations. The farm retails packaged meat from its 80-90 finished animals per year, and it routinely sells all it can produce. Buyers comment not only that they really like the meat's flavor, they also approve of the farm's humane raising of livestock, and they appreciate that the farm's environmental stewardship is so evidently conscientious.

Focus The farm has 27 paddocks, each about nine acres, often bordered by woods, with terrain that can be traveled by tractor for grass clipping to about 4 inches height after having been grazed. Henry places 50-150 animals on temporarily fenced areas of 3-4 acres. Each temporary area is grazed to no lower than 4 inches of grass height, or for 1 day, 4-6 times during the season.

As cattle pass through gatings between fenced areas, they are inspected for fly concentration and lightly sprayed, if necessary, with a pyrethrin solution (permitted for use in dairy milk houses). A newly entered paddock, not yet having a concentration of manure, will have fewer flies than the previous one. Next are the many birds on the farm with their natural habitats of forest and wetland kept intact. The local Girl Scout Troop made and placed 40 birdhouses later occupied by Bluebirds and Tree Swallows. Cow birds abound, often perching on the cattle, awaiting arrival of a few more morsels. Lastly, yes, grazing conditions provide abundant fresh air ventilation for dispersal of any manure odors generated at the newly grazed areas.

Comment Evidence of Tussock-Sedge cattle's thriving: During recent years, the herd's yearly incidence level of pinkeye is usually zero. Henry's management approach is to avoid getting in nature's way. Its operation reminds us of how well it can go for both animals and humans when we adhere closely to natural guides. Or at least keep learning how to avoid getting in their way: Thoreauvian at heart.

Future Having observed higher than acceptable levels of fly populations on the animals at the watering stations, he will take the advice of other stockmen with a similar situation by locating baited fly traps adjacent to those areas.

New Old Piggeries

Now we visit not a single farm but a group of 40+ family-sized farms, on the islands of Hawaii, accomplishing a new increase of swine production by a modernized version of Korean natural farming (KNF). This swine housing method, known as the Inoculated Deep Litter System (IDLS), prevents production of manure odors which helps prevent proliferation of pest flies. The system successfully addresses the typical problems of animal confinement. It is also used where access to pasture is available.

KNF was developed by the Korean teacher, Han-Kyu Cho. It has been described as an efficient, highly productive version of permaculture. The detailed, practical approach is used throughout Asia. Livestock management is one part of this system.

Michael DuPonte, Extension Agent and Livestock Specialist with the University of Hawaii, has centrally figured in the state-wide investigation and implementation of the

method. His work has been featured in recent issues of *Acres U.S.A*. (Please see February 2014 issue.) http://www.ctahr.hawaii.edu/hnfas/individualPages/duponte.html
http://www.ctahr.hawaii.edu/oc/freepubs/pdf/LM-23.pdf

Focus The absence of odor and flies at the Kang Farm's active swine confinement shelter is seen as due to this cluster of bio-agent + methods: (1) bacterial decomposition agent -- litter decay process introduced and maintained by applications of a biological inoculating agent; (2) physical destruction of fly larvae and oxygenation of upper layer of litter -- the constant "roto-tillage" of litter surface by pigs' hooves; (3) dry litter surface -- morning and afternoon sunlight exposure; (4) abundant ventilation – passively-directed air flow up and away from litter level by chimney effect induced by shelter's design of roof, open-air walls, and N-S oriented siting.

The first and now primary demonstration and education piggery, the farm near Hilo has hosted to date 5,000+ visitors during the past four years. Other KNF piggery-education sites on the Islands have hosted another total of 7,000 visitors. Swine producers and the interested public from the US and world-wide come to view these piggeries. What are the piggeries' most amazing features that 12,000+ visitors agree on? Happy hogs free of odor and flies.

Comment That's a remarkable consensus from so many anecdotal observations.

Future Michael and his office intend that there be ever more happy hogs raised by happy farmers. He welcomes all inquiries. The office expects to formally educate professional advisors on how an ecological pig pen can become a tourist destination.

MORE PICNIC SITES

Thoreau the cabin builder at Walden Pond knew that action gives reality to plans. Readers may: (1) adjust one's own manure odor-fly prevention program; (2) tell others that by identifying manure volatiles as fly attractants, ecological agriculture has a powerful tool for fly prevention; (3) encourage organizations to recognize the MO-AF natural linkage as a new opportunity to advance the ecological farming community's wellbeing.

James Silverthorne raised, trained, and pastured horses for 35 years at his farm in northeast Pennsylvania. He found best results with homeopathic medical treatment for the animals, mineral amendments to pastures, and abatement of manure odor production at animal shelter areas. Before that, he worked with cattle, hogs, and goats. He learned open country riding on a Texas cow-calf ranch, 1950s. He says his horses educated him more than the few maneuvers he taught them. He learned from them when and how to ask questions: Often and simply. Email: <js.eco-ag@usa.com>