Animal Science

Do veterinarians need ethylene oxide?

Ethylene oxide (EtO) is a gas used widely to sterilize surgical equipment that can't tolerate steam sterilization. In the past, its use has been linked to high rates of miscarriage (SN:1/22/83,p.54) and subtle white-blood-cell chromosome changes in exposed hospital workers (SN:3/26/83,p.202). Now environmental epidemiologist John I. Freeman, with the North Carolina Department of Human Resources in Raleigh, has challenged its use in veterinary practices.

Based on a written survey of his state's veterinary clinics, he found that only about 14 percent found a need for this sterilant. More important, site visits to nine clinics that did use it showed that five were exceeding the Occupational Safety and Health Administration's "action level" for the chemical of 0.5 parts per million (ppm) in air when they used it. Although employers are supposed to monitor pollutant levels and keep employee exposure records when EtO levels exceed the action level, Freeman found that the North Carolina establishments he visited did not. Moreover, three of those clinics' EtO levels clearly violated OSHA's permissible-exposure limit of 1 ppm.

Freeman says that as a result of his findings, announced at a state veterinary meeting last year, "I think most [veterinarians] in North Carolina have quit using it." Most, he found, had used EtO to sterilize common household drills for use in orthopedic surgery. They can avoid the problem by buying different drills or by using steam-sterilized metal drill-bit extenders to avoid contaminating an animal with a nonsterile drill. Alternatively, he says, they can use the chemical under a ventilation hood.

Scared of trichinosis? Check with ELISA

According to the Centers for Disease Control in Atlanta, trichinosis is still a public health hazard. Between 1983 and 1985, at least 152 people in the United States contracted the disease; one died. But a quick blood test, just approved for commercial use, can identify which pigs contain the parasitic trichina worm. For states that choose, as Illinois has just started this year, to control trichinosis by culling contaminated animals prior to slaughter, it identifies infected pigs. Ultimately, it is envisioned as a screening test for use by slaughterhouse inspectors. The meat of animals whose blood passed the test could carry a seal certifying that it was trichina-free.

The test, an enzyme-linked immunosorbent assay (ELISA), looks for an antibody reaction to the trichina worm. A protein antigen from the worm is attached to a plastic surface. Then a blood sample is placed in contact with the antigen. If the animal is infected with the worm, a trichina antibody in its blood will stick to the antigen. After the blood is washed away, an enzyme is added that adheres only to the pig's antibody. The amount of enzyme that adheres — measured by how yellow the substrate gets — shows the level of any trichina infection. Though the whole procedure takes an hour, automation allows on-site processing of as many as 800 to 1,000 blood tests per hour at an average cost of about a penny per pound of meat involved, according to Diane Oliver, president of Idetek, the San Bruno, Calif., firm that has just begun marketing the test.

Even if trichina can be eliminated from some pork, what about *Toxoplasma gondii,* a potentially more serious parasite present in some pork (SN:7/19/86,p.37)? Toxoplasmosis concern "is a valid one," Oliver says. However, she adds, "by eliminating trichina you tend to eliminate toxoplasma, since the same poor management practices — harboring rats, feeding pigs garbage and permitting them to eat other pigs that have died in the same pen — tend to foster both parasite infestations in herds. Moreover, she notes, her ELISA can be adapted to test simultaneously for other pathogens or meat contaminants like antibiotic residues. In preliminary tests looking for toxoplasma, she says, the ELISA "worked very well."

Physics

A disbelief in 'cygnets'

Is there some strange radiation coming from the celestial object Cygnus X-3 or isn't there? Some months ago a group of physicists working with a particle detector in the Soudan iron mine north of Duluth, Minn., reported observations of such radiation. It seemed to involve some hitherto unknown, very energetic subatomic particle, to which they have given the provisional name "cygnet" (SN:10/12/85,p.231). Negative results from other detectors presented at this meeting seemed to lead many physicists to dismiss the idea, but Marvin Marshak of the University of Minnesota at Minneapolis, one of the leaders of the Soudan group, not only insisted on the accuracy of the Cyg X-3 observations but also presented a claim for similar radiation from four other objects of the same class as Cyg X-3.

Cyg X-3 is a binary star that is a strong emitter of X-rays. What appeared in the Soudan detector were muons, which seemed to be produced by some invisible, highly energetic particles coming from the direction of Cyg X-3. The Soudan detector and the others under discussion — all intended to look for radioactive decay of the proton — are mostly calorimeters, large arrays consisting of iron plates separated by narrow spaces filled with gas. The plates serve to slow any radiation that may enter the detector or appear spontaneously within it, and the gas serves as a medium to record the paths of the radiation. As proton decay is expected to be extremely rare, these detectors are located deep underground to shield them from background radiation.

In those positions, however, the detectors can also detect radiation coming from beyond the earth if it is energetic enough to penetrate to their depth, and the lack of background will make it show up bright and clear. That is what the Soudan group says happened with Cyg X-3 and why the scientists were able to trace the paths of the cygnets back to Cyg X-3. Now they claim similar radiation from four more binary X-ray sources: Hercules X-1, Scorpio X-1, 4U0115+63 and 1E2259+586.

Last autumn scientists running a detector called NUSEX, located in a tunnel under Mont Blanc on the French-Swiss border, reported an apparent confirmation of the original Cyg X-3 detection. While no one from NUSEX spoke at the Berkeley meeting, detractors were well represented. Chief among them was the group operating the Fréjus detector. Fréjus is also in a tunnel under the Alps, this one between Mostane, France, and Bartolovecchio, Italy. Luciano Moscoso of the Centre d'Etudes Nucléaires at Saclay, France, reported that Fréjus should have seen cygnets but has not. So far it might be called a borderline case, but there are two further negatives. Robert C. Svoboda of the University of California at Irvine reported that the IMB detector, which is in a salt mine under Lake Erie near Cleveland, should have seen cygnets and didn't. Daniel J. Cutler of the University of Utah in Salt Lake City reported that a detector located in the Mayflower mine in Utah also should have seen cygnets and didn't.

These detectors are all at different depths under different geologies and of different dimensions and slightly different composition. They are hard to compare with each other. Marshak alleges some of them shouldn't have seen cygnets. Furthermore, he says, Cyg X-3 turns on and off; its last outburst recorded at Soudan occurred in October 1985. Some of these detectors were not looking then, he avers.

Moscoso and Fréjus representative Claude Longuemare of the University of Paris South at Orsay replied that Fréjus was up and looking in October. Marshak responded that at that time Cyg X-3 should have been directly overhead, and the cygnets would have gone through the detector vertically and undetected. Not so, Moscoso and Longuemare insisted, but Marshak remains adamant. It is difficult, after all, to prove the nonexistence of something by negative evidence.