First Live Gene-Splice Release: It's Already History

While arguments, investigations and lawsuits ferment around the proposed field test of a frost-preventing bacterium (SN: 3/29/86, p. 198), another live genetically engineered microorganism not only has been field-tested but has been in commercial use. This week the U.S. Department of Agriculture (USDA) halted sales of this viral vaccine in response to charges that in licensing it the department failed to follow federal guidelines.

Last October, pigs on an Illinois farm were experimentally vaccinated with a live virus genetically engineered to lack part of a natural gene. The new vaccine, which is intended to protect swine against a deadly disease called pseudorabies, next was field-tested in pigs in several midwestern states and then was put on the market.

The genetically engineered vaccine was licensed for marketing by the USDA in January, with no public announcement and without being formally considered by the department's Recombinant DNA Research Committee.

This license violates federal guidelines for recombinant DNA research, charges Jeremy Rifkin of the Washington, D.C.-based Foundation on Economic Trends. In response to a petition by Rifkin, the USDA this week suspended until April 22 the license issued to the vaccine's producer, the TechAmerica Group, Inc. of Omaha, Neb. The USDA said it would "document our procedures more fully with respect to the environmental assessment of the vaccine's use." Rifkin says he will continue to demand a full environmental assessment by the USDA Recombinant DNA Research Committee, not just a "hurried little paper."

Rifkin's public disclosure last week of the quiet USDA approval of field tests, and then licensing, of a genetically engineered organism came just a day after the distribution of a government report concluding that the USDA "has not formulated a well-defined regulatory structure" for the deliberate release of genetically engineered products.

The General Accounting Office (GAO) study says the USDA "has not provided its Agriculture Recombinant DNA Research Committee with the authority and direction it needs."

While doing its study, the GAO was not informed of the live genetically engineered vaccine that was under consideration and then approved. The GAO report, which was reviewed by the USDA before publication, includes comments from a USDA "top microbiologist" indicating that the department was not considering any live recombinant organisms for injection into animals. Future use of such organisms would require "some regulatory or procedural changes," GAO was told.

Officials within the USDA disagree on whether the department erred in the procedure that approved the pseudorabies vaccine. Assistant Secretary for Science and Education Orville G. Bentley says the field-testing and marketing application should have come before the USDA's Recombinant DNA Research Committee.

David Espeseth of the Animal and Plant Health Inspection Service (APHIS), the USDA branch that approved the genetically engineered pseudorabies vaccine, says the licensing procedure met all applicable requirements. "In our evaluation, the characteristics of the virus raised no public health or environmental concerns," he says. "It is safer than the [other] modified live viral vaccines on the market for pseudorabies."

In explaining why the genetically engineered virus was not formally evaluated by the Recombinant DNA Research Committee, Espeseth says, "Use of the vaccine is not a release into the environment. It goes into an animal and doesn't go beyond it. The word 'release' is not defined anywhere."

Espeseth told SCIENCE NEWS that during the licensing procedure, the consideration of the vaccine had, in fact, been presented "informally" to the Recombinant DNA Research Committee. One scientist reviewing the vaccine application was a member of the committee and had kept it informed, Espeseth says.

The live virus vaccine was developed and patented by Saul Kit of Novagene, Inc. of Houston. He used recombinant DNA techniques to remove part of the gene for the protein called thymidine kinase to weaken the virus and decrease its ability to cause disease.

The vaccine is considered safe, in part, because the only change from the parent is a genetic deletion; no new genes were added. However, the frost-free bacterium, whose release has been under debate for several years, also differs from its parent by only the deletion of a gene.

Initially the USDA did not inform the states in which field tests were being held that the virus had been produced by genetic engineering techniques. Then, last November, the department issued a new product code number ending in the letters "RO" to designate recombinant organisms, and TechAmerica informed state officials of the derivation of the vaccine "to avoid any misunderstanding."

This is only one of the many new vaccines that are being developed with genetic engineering techniques. One approach, being employed for instance in the development of a malaria vaccine (see p. 232), is to use genetically engineered bacteria to produce a substance, not an intact organism, that will trigger the desired immune response. Field tests and clinical trials of such vaccines are not considered release of genetically engineered organisms.

Another strategy is to infect animals or people with a live virus whose genes have been altered. Laboratory tests are under way with standard vaccine viruses to which scientists have added new genes (see story, this page)and with disease-causing viruses from which genes have been deleted, as was done in the pseudorabies vaccine.

The pseudorabies virus is the first live recombinant vaccine acknowledged to be in use outside the laboratory. Rifkin says, "Now we think that others [under USDA approval] probably are being used in field tests."

Vaccination with a live virus is considered by many scientists to be an environmental release, because the virus might pass from a vaccinated animal to others and/or might survive outside its host.

— J.A. Miller

AIDS protein engineered

National Institutes of Health researchers in Bethesda, Md., have coaxed vaccinia virus, used in smallpox vaccinations, to produce an AIDS virus protein. The feat will allow them to analyze the protein's vaccine potential.

The AIDS virus gene that codes for the virus's protein envelope was inserted into the vaccinia virus by a technique that is already being used to produce proteins from other pathogens (see p. 232 and SN: 6/15/85, p. 379). "What we've done is to make a recombinant virus that expresses the protein," says Bernard Moss, one of the researchers. "Now we can ask questions that may be pertinent to making a vaccine."

Mice inoculated with the recombinant virus produced antibodies to the AIDS protein, the scientists report in the April 10 NATURE. But further work is needed to determine whether it can be used as a vaccine, Moss notes. Among the questions are whether it will raise antibodies in primate systems as well, whether those antibodies are capable of neutralizing the virus and whether the antibodies will be effective against different strains of the virus. The recombinant virus would not help people with AIDS, he notes, because their immune systems are already damaged. □