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Mad cows cast long shadows

Scientists may escape the worst of the flak from Britain's BSE inquiry, but they ignore its lessons at their peril.

After 34 long months, the public inquiry into Britain's BSE epidemic is to be released this week. Its 16 volumes will make uncomfortable reading. The report is expected to describe how attempts to protect the interests of the agriculture industry were allowed to override concerns about public health — and how, ultimately, both came to suffer. It seems likely that government ministers from the late 1980s to the mid-1990s, plus a number of senior civil servants then at the Ministry of Agriculture, Fisheries and Food (MAFF), will be sharply criticized for their roles in shaping this course of events.

The inquiry is also expected to address the adequacy of the system of providing, and acting on, scientific advice to government. It will examine how a lack of scientific knowledge about the risks posed to human health by an emerging disease of cattle became transformed in ministers' statements into assurances that there was no cause for concern. It would be harsh if the scientists who advised the politicians are themselves censured. But even if the inquiry judges them to have been blameless, there is much for the scientific community to learn from the BSE affair.

From evidence given to the inquiry, and the experience of *Nature*'s staff in reporting on the epidemic, a sorry tale emerges. It is a story of MAFF concentrating government funding into a few 'trusted' laboratories — not necessarily those with the most appropriate expertise (see page 932). The ministry also held a veto over the publication of results from this research. And this journal has previously criticized a culture of secrecy within MAFF that prevented independent groups from analysing detailed epidemiological data (see *Nature* **383,** 463; 1996).

MAFF also promulgated the view that BSE was caused by the same agent as a related disease of sheep called scrapie, even though the evidence was equivocal. This was a comforting assumption, as scrapie had been present in British sheep for more than 200 years, with no evidence of any risk to human health. When evidence began to emerge that BSE was distinct from any known strain of scrapie, the official line did not change significantly. Today, experts say that it is impossible to determine whether the BSE agent crossed over from sheep, arose *de novo* in cows or had been present subclinically in cattle for many years. But it seems clear that it spread through British herds through the practice of feeding cows on meat and bone-meal derived from cattle carcasses.

In their defence, ministers of the day have pointed out that the precautionary measures taken in the late 1980s went further than the scientific advice they were given. But having taken the view that BSE was likely to pose no greater risk than scrapie, it is clear that these measures were not strictly enforced. Epidemiological data reveal that infected tissues continued to find their way into cattle-feed, even though the practice of feeding cows to cows had been banned since July 1988. The extent to which traces of potentially infective bovine central nervous tissue continued to enter the human food chain is unknown.

It is easy, with the benefit of hindsight, to criticize scientists for not making more of a fuss about the control that MAFF exerted over research, and for failing to dispel the continuing 'BSE is scrapie' complacency. But to do so would ignore the political and financial climate of the day. In the late 1980s and early 1990s, British agricultural and veterinary research was being 'restructured' — a euphemism for being cut to the bone. No surprise, then, that many scientists were keeping their heads down, not wishing to be identified as troublemakers.

Given the damage caused by the BSE affair, however, we now know the dangers of keeping silent. Of course, the main victims are those whose lives have been tragically cut short by a horrific disease. But science, too, has suffered. With ministers having consistently claimed that they were following the best scientific advice, even while subtly misrepresenting its message, scientists — particularly those working for government — have come to be seen by the British public as part of the problem. It will take much work to regain public trust. ■

Recognition for mathematics is overdue

The prospect of a boost in funding for US mathematicians should be warmly welcomed by the entire scientific community.

In proposing a major new initiative in mathematics (see page 931), Rita Colwell, director of the National Science Foundation (NSF), is recognizing problems that have been apparent to US mathematicians for some time. If enacted, its positive ramifications will extend beyond university mathematics departments.

The United States enjoys global leadership in many branches of mathematics, but this conceals some festering problems. First are weaknesses in its educational system. According to the Third International Mathematics and Science Study, US students do quite well in mathematics at age 9, rather badly at 13 and abysmally at 17. US universities also do poorly at recruiting American students into mathematics, especially at the graduate level. Twenty years ago, three-quarters of US mathematics PhDs were Americans: today, more than half are foreign-born.

For those who persist into academia, grant support is paltry by US standards. And agencies that once gave generous support for university mathematics, such as the departments of energy and defence, now leave the NSF to foot two-thirds of the bill.

Yet mathematicians are much in demand. Their research has been applied in search engines and other Internet tools, and underpins progress in other disciplines. Thanks to the rise of genomics and structural biology, and the realization that modelling can yield valuable insights into biological systems, this is now as true in the life sciences as in the physical ones.

Colwell is aware of these challenges. In an ideal world, she says, the NSF's $125 million mathematics budget would double in two years, and double again thereafter. Progress towards these goals would allow bigger grants, better linkages with other disciplines, new research institutes and improved ties between universities and high schools.

If this wins the backing of Congress and the next US administration, the whole of science —and society at large — stands to benefit. The initiative would concentrate on aspects of mathematics — such as the study of dynamic systems and the modelling of uncertainty — that will help tackle problems that affect us all. ■

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