NIH-funded genome center at the University of Michigan. But, he adds, "the timing took everyone by surprise. We all thought it was 3 or 4 years away." Without question, Collins adds, Bourke's scheme would not have caused such outrage if he hadn't gone after Sulston and Waterston and their worm project. At a time when the Genome Project is under closer scrutiny, "theirs is the project everyone brings up when we are asked if we are making progress."

Sulston and Waterston seem bemused by all the fuss, though they do understand British sensitivities about a brain drain. They point out that they haven't agreed to anything; indeed, they have yet to receive a written offer from Bourke. But they are tempted by the possibility of a substantial infusion of up front capital that would enable them to finish the nematode sequence several years earlier, perhaps by 1997 instead of 2000. Their non-negotiable demand—which Bourke has already agreed to—is that all of their work remain in the public domain.

What's in it for Bourke? A role in what he thinks is the next industrial revolution, one spawned of the information that will be derived from the DNA sequences of humans and other organisms. If he can snare Sulston and Waterston and several others as well, he intends to invest $50 million in building what is being billed as the "largest DNA sequencing engine in the world" in Seattle, close to the new department of Hood, Bourke's adviser.

In the short term, at least, Bourke envisions a contract service company that would sequence large chunks of DNA for the government, universities, and pharmaceutical companies, serving, in a sense, as the Martin Marietta of the Genome Project. Where Sulston and Waterston come in is in building the capability to sequence 100 million bases or more a year, which is their goal for the nematode project. If they can pull it off, that sequencing ability can then be turned loose on more lucrative projects, such as developing new diagnostics and therapeutics.

As for the proprietary concerns the critics raise, Bourke insists he has no interest in patenting the sequence data or in keeping them secret, though the company will get a first look at anything interesting its scientists turn up. All sequencing done for the government would be publicly available, though projects undertaken with pharmaceutical companies would remain confidential.

Bourke says he will decide within the next 2 or 3 months whether or not to launch the company. "I won't do it unless I can hire the best people in the world," he says. As he continues his quest for the best and the brightest sequencers, he seems certain to ruffle yet more feathers. ■ LESLIE ROBERTS

Third World: S(ave) O(ur) S(heep)!

To city slickers, a moo is a moo is a moo: We recognize little diversity among breeds of livestock like cows and sheep. But a new initiative by the United Nations Food and Agriculture Organization (FAO) highlights the varied nature of these species, especially in developing countries, and warns that we may be courting trouble by allowing valuable indigenous livestock breeds to go extinct. "Breeds in developing countries are coming under fire. They're at risk," says David Notter, an animal geneticist at Virginia Polytechnic Institute.

Indigenous breeds are being pushed toward extinction because native farmers, in the interests of greater productivity, have in many cases adopted specially bred Western animals like the American Holstein or European Friesian cow. And, as a result, some of the valuable genetic characteristics of the native breeds are vanishing as the newcomers replace them.

The attraction for Third World farmers is that Western breeds have been improved through selection methods to be better producers of milk, eggs, and meat. But, because they are accustomed to constant grain, antibiotics, and temperate climate, modern breeds like the Holstein sometimes cannot handle the more rigorous life in poorer developing countries. "Many of these high-tech animals are not very successful, but it takes a few seasons to learn this," explains Don Bixby, executive director of the American Minor Breeds Conservancy. By then, however, the stock of native breeds can degrade considerably.

Eye-openers. *These African N'Dama cattle will be targeted by FAO conservation efforts—because they are resistant to sleeping sickness.*

To combat this trend, the FAO now proposes a $15 million, 5-year plan to preserve the genetic diversity of breeds in Africa, Asia, and South America. Included in the proposal are a world inventory of native livestock breeds, conservation banks of frozen semen and embryos from selected threatened animals, and assistance in the breeding of native animals to improve productivity—so farmers won't be so tempted to replace them with imports.

Advocates of the program say the point isn't merely to conserve indigenous species but to make their genetic heritage available for improving livestock. "Livestock improvement and livestock conservation are part of the same package. And livestock improvement is a must for us," says Notter. For example, a better pig may develop from the Taihu breed in China, a strain that has drawn attention because of its remarkable fecundity—it can produce twice as many piglets per litter as Western breeds. The short, fat pig has little else going for it, but the genes that control fecundity could be invaluable in cross-breeds.

FAO's first action has been to start compiling an inventory of all native livestock breeds and strains. An expert consultation scheduled for Rome this April will evaluate the rest of FAO's proposal and discuss how to fund the effort. In addition to committing $3 million from its own budget, the FAO will receive $1 million from Japan and hopes other developed countries will contribute money.

A topic that may prove controversial in Rome is what breeds should be added to the semen and embryo banks. The choices are limited by funding constraints, and one group of scientists believes the banks should focus only on strains that contain known valuable genetic material like that for disease-resistance or high fertility. A second faction suggests that since researchers have little idea what characteristics may be important in the future, anything unique should be saved.

In addition to storing genes, the FAO will try to conserve and improve existing populations of endangered breeds like the N'Dama cattle of Africa and the Murrah buffalo of Asia. With the help of modern breeding practices, the native livestock may one day match the production of Western breeds. Lastly, the FAO hopes to establish a legal framework that addresses issues like global trade in animals and their germ plasm. All these measures, advocates of the program hope, will help save the indigenous heritage of livestock—keeping the right moo in the pasture. ■ JOHN TRAVIS