add small quantities of antibiotic drugs to animal feeds. By a mechanism not thoroughly understood, a steady diet of antibiotics allows animals to gain weight more rapidly. Also, as noted in an appendix of the NAS report of last March, it permits cheaper operating procedures at feedlots and meat packinghouses.

Consider pigs. It is estimated that in 1978 pigs taken to market in the United States consumed about 40 percent (or about 1.4 million kilograms) of the antibiotics used as feed additives. About half the antibiotics produced in the country are now used in feeds. "The swine industry," reports appendix K, written by the Board of Agriculture and Renewable

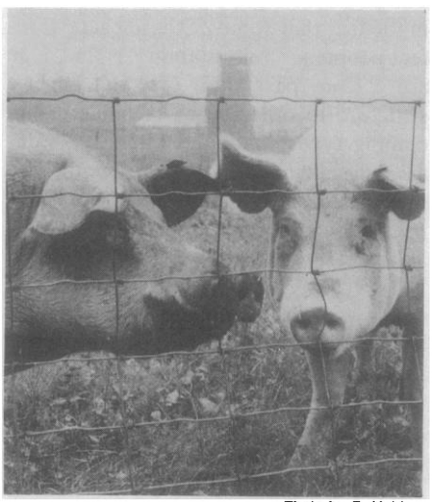

Photo by C. Holden

Drug users.

Resources of the NAS, "has changed from an enterprise that historically employed pasture to one that predominantly employs confinement buildings and concrete lots." (While pig production has increased, the number of pig farms declined from 1.4 million in 1954 to 450,000 in 1974.) The report continues:

> With concentration and confinement production, the enteric diseases and respiratory diseases are the most prevalent problems reported.
>
> As a group, both the large producers and the organized sow-farrowing farms employ an early weaning management system whereby the nursing pigs are weaned at 3 to 4 weeks of age. . . . Because of the high fixed costs, the management places a high priority on total production. With early weaning, the sow can be re-bred within a few days after her pigs are weaned and thereby increase the number of pigs produced per sow per year. . . . In the process of early weaning, natural protection from enteric disease problems in young pigs has been diminished (IgA immune globulins in sow's milk).
>
> . . . [T]he introduction and use of feed-additive antibiotics has been concurrent with change in production technology in the swine industry. It is likely that the use of antimicrobial agents has facilitated the development of the concentrated operations.

Discovery by Decree

A mathematics breakthrough is announced but details are not forthcoming

There never was any doubt in mathematicians' minds that Robert L. Griess, Jr., a visiting professor at the Institute for Advanced Study, was a prime contender to discover the "monster group," a postulated mathematical construct whose existence would be of great theoretical importance. Griess is one of several who defined the group and for the past 6 years he has been openly working on a proof that it exists. On 14 January of this year, Griess announced that he had done it. He sent a cryptic mimeographed note to his competitors and other interested parties saying that he had constructed the group and that his construction is "direct, explicit, and carried out entirely by hand. I like it." He concluded by wishing the note's recipients a happy new year.

Griess's announcement sent shock waves through the mathematics community. If true, his discovery would be an important result. The monster group truly is a monster—the number of its elements is about 8×10^{53}. It is thought to be the largest of all so-called finite simple groups. Of particular interest is Griess's claim that he constructed it by hand, since other, smaller such groups were constructed with computers. The monster group also seems to be related, in an as yet obscure way, to certain areas of number theory.

But as the weeks drag on since Griess's announcement, mathematicians are growing increasingly curious about the result. Griess refuses to tell anyone just how he constructed the group or even to commit himself to a date when he will release the details of his discovery. *Science* asked Griess what the details of his proof are, when he will write the proof up, and why he announced the result without being willing to release any details. To all of these questions, Griess replied "no comment."

Still, Griess is getting publicity and credit for his reputed discovery. In February, the National Science Foundation (NSF), which funded his work, issued a press release that said Greiss "succeeded in constructing" the monster. Alvin Thayler of the NSF explains the agency's action by saying, "Griess is a first-class researcher. There is no reason not to believe him. I trust him."

In May, *Scientific American* will publish an announcement of Griess's discovery in its Science and Citizen section. Judith Friedman of *Scientific American* says she decided to go ahead and write the story because it is her feeling that the mathematics community believes Griess. She was able to reach Griess by telephone but got nowhere with her requests for details of his proof. "I really tried to get something out of him and it was impossible. I said, 'give me a hint, anything' and he said 'no,' " she says.

Even those who know Griess well say he refuses to tell them how he did his work. Daniel Gorenstein of Rutgers University in New Brunswick, who is a leading authority on finite simple groups, says, "Sure, I know Griess. He comes to our seminars. I even go out to dinner with him sometimes." But Gorenstein is no more informed than anyone else on the construction of the monster.

As to why Griess is behaving in this eccentric way, mathematicians have two hypotheses. One is that he is trying to milk his method as much as he can before he releases it to his competitors. The other is that Griess is still checking to see whether his proof really works but he decided to announce the result anyway to establish priority.

Whichever hypothesis is correct, Griess did manage to be credited with discovering the monster. There are few other examples in modern science of a claim being established simply on the basis of a note saying essentially, "I did it and I like it." But, as is frequently pointed out by Griess's colleagues, he'll look awfully stupid if he doesn't eventually come up with some details.—GINA BARI KOLATA

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