

# The Case Against bGH

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*ABSTRACT* In the voluminous literature on the subject of bGH we have yet to find an attempt to frame the issue in specifically moral terms or to address systematically its ethical implications. I argue that there are two moral objections to the technology: its treatment of animals, and its dislocating effects on farmers. There are agricultural biotechnologies that deserve funding and support. bGH is not one of them.

There are times when the drive [for technological progress] needs moral encouragement, when hope and daring rather than fear and caution should lead. Ours is not one of them.<sup>1</sup>

Bovine growth hormone (bGH) is a protein that occurs naturally in cattle. Produced by the pituitary gland, it regulates the cow's lactational cycle; generally speaking, the more bGH a cow has, the more milk she gives. Using the techniques of genetic engineering, researchers at Monsanto Company have devised low-cost techniques to manufacture the drug artificially. The plan is to sell the product to farmers who will administer it in daily doses to their animals. Monsanto's motivation is not hard to discern: a single dose of bGH may cost them ten cents to make and yet be sold to farmers for fifty cents; a worldwide market of \$1 billion a year is predicted by Monsanto's Vice-President, Lee Miller; and a profit ratio of \$2 returned per every dollar invested is foreseen.<sup>2</sup> The first agricultural biotechnology to hit the market, it will be commercially available as soon as the Food and Drug Administration

finds it safe for consumers. Approval is expected before the end of 1990.

The product works. Daily injections cause dairy cows to increase production of milk between 10 and 15 percent.<sup>3</sup> (A study funded jointly by Cornell University and Monsanto in 1984 showed some cows increasing production as much as 41 percent, but these results are not expected in the field.) In addition to Monsanto, at least three pharmaceutical companies, Eli Lilly, Upjohn, and American Cyanamid, believe that they can produce and sell bGH so cheaply that large, efficient, dairy farmers will not be able to do without it.

The social benefits seem clear; some farmers will be able to produce more milk from fewer cows using less labor. Dairy operations with large herds are expected to cull their less productive cows, put more feed into the remaining ones, and get the same amount of milk. All this, presumably, while farmers reduce their working hours. As the senior vice president for research and development at Monsanto exclaims, "In the future, a farmer using BST will be able to produce as much milk with 70 or 80 cows as can be produced with 100 cows today, use 15 percent less feed to pro-

duce that milk, and finally have a chance to be more profitable!"<sup>4</sup> Consumers are also supposed to benefit; as dairy farmers save money, their decreased costs will be passed along to shoppers in the form of lower milk prices. And the nation's poor, who need the same amount of calories and calcium as others but who have to pay a larger share of their personal income to get it, will benefit even more than the middle-class consumer from slightly lowered food costs.

With so many benefits promised, why has bGH become anathema to some farm and consumer groups? In April of 1986 a coalition of farm and environmental organizations asked the FDA to prepare an environmental impact statement on bGH. Led by Jeremy Rifkin and his organization, the Foundation on Economic Trends, the group included the Humane Society, the Wisconsin Family Farm Defense Fund, Wisconsin's Secretary of State, and was later to be joined by the Audobon Society, the Wisconsin Farmers Union, and the Farmers Union Milk Marketing Cooperative.<sup>5</sup> The FDA turned down the request. Without examining the philosophical merits of the farmers' case, the Regulatory Affairs Commissioner of the FDA claimed that the requested assessments had already been performed and, in fact, were "submitted to the FDA with investigational new animal drug (INAD) applications pending before the agency."<sup>6</sup> While the FDA has not expressed interest in the wider ramifications of the farmers' case, those interested in the future of rural America, agriculture, and farm animals have. As a result, a voluminous literature on the subject of bGH has quickly developed.<sup>7</sup> Unfortunately, no attempt has been made to frame the issue in specifically moral terms or to address systematically its ethical implications.<sup>8</sup>

The farmers' opposition is based on three claims: that bGH is harmful to the environment, constitutes inhumane treatment of cows, and will displace farmers from already-distressed rural communities. Since any "environmental" damage caused by the drug would be linked to its effect on dairy cows or humans, the farmers' case effectively consists of two claims: that bGH represents an inhumane method of treating animals, and threatens to dislocate an unacceptably high number of disadvantaged farmers. Predicting that the use of bGH will drive as many as 30% of all dairy farmers out of business, Rifkin claimed that bGH usage would lead to "the single most devastating economic dislocation in U.S. agricultural history."<sup>9</sup> Nor will the farmers affected be randomly selected; arguably, they will be primarily small and medium-sized farmers in later stages of their

careers with small herds or high debt loads lacking highly mechanized and intensively managed operations.

I consider the farmers' two claims below.

### 1. Humane treatment of cows

Several contemporary philosophers have argued that higher mammals such as cows possess all of the characteristics needed to be bearers of moral rights; sentience, purpose, social life, intelligence, emotions, etc.<sup>10</sup> To possess moral rights is just to be entitled to fully equal treatment; we do not countenance discrimination against children with Downs syndrome even though they are not as sentient, purposive, or rational as we are. Since they have moral value, they have it fully, and are entitled to equal treatment.

If adult higher mammals possess moral rights, then we must treat them the same way we treat humans who, like animals, lack certain characteristics of normal humans. It is permissible for us to act paternalistically toward them insofar as they need extra care. But we may not exploit those beings who lack a certain measure of linguistic ability or emotional security or physical autonomy. If Tom Regan and Ned Hettinger are right, we ought not to do to cows anything that we would not do to mentally enfeebled human beings; the differences between cows and the "marginal human" cases are morally irrelevant.<sup>11</sup> On the animal rights view, allowing scientists to administer bGH to cows simply to observe its effects would be similar to allowing scientists to administer it to brain-damaged adults for the same purpose. We would not allow this to be done to any human who was not capable of giving (or withholding) informed consent; consequently, we ought not to allow it to be done to other beings in the identical position.

The strictness of the animal rights viewed has been criticized as failing to make relevant moral discriminations. For example, moral value is not like a light switch that is either off or on. It comes in gradations, as our ability to acquire more of it (through education) and to lose some of it (by entering an irreversibly comatose state) shows. The quality, intensity, and complexity of different animals' mental and social lives make them bearers of different gradations of moral value. In addition, it is sometimes appropriate to use another as a means to our own ends even if the other possesses the full complement of moral value. We do this often, as when we allow attendants to fill our gas tanks, or when we ask our hosts to provide us with a glass of seltzer. It is not always morally objectionable to use another as a means to our

own ends even if that other is the possessor of supreme moral worth. Each of these considerations points to a morally relevant distinction that Regan fails to make in his either/or case (either adult mammals have moral rights in the same sense that humans do or they do not).

A less controversial stance is that animals have gradations of inherent value determined in part by the complexity and intensity of their social and mental life, and that we must act toward them in ways that respect this value.<sup>12</sup> Supposing that we could successfully defend the "humane treatment" of animals view, would the use of bGH be acceptable?

An answer to this question relies on our being able to assess the degree to which bGH-use diminishes the quality of the animals' physical and psychological health and, if it does, whether this harm is justified by the benefits it confers. Accurate data about the long-term effects of bGH are not available, but studies have been completed of the effects of using bGH during one lactational cycle.

bGH works by stimulating the division of muscle and liver cells and, apparently, inhibiting the growth of fat cells. (This is the reason for its attractiveness beyond the dairy industry; beef and swine producers expect it to lead to leaner meat.) Evaluations of the effect of the drug on the overall health of the animal are divided between those who see few if any adverse effects and those who are more skeptical. Don Beitz, animal scientist at Iowa State University, notes that while use of bGH leads to increased feed consumption, bone growth (in young animals), muscle growth (in adults), and milk production, the efficiency of the digestive tract and reproductive system seems to be unaffected; the birth rate of calves is the same for treated and untreated mothers.<sup>13</sup> Beitz acknowledges that treated animals do require more intensive management since their nutrient requirements are greater, but he does not anticipate deleterious effects from proper usage of the protein.

Others are more concerned. David Kronfeld of the University of Pennsylvania claims that high levels of bGH result in "subclinical hypermetabolic ketosis, a condition associated with reduced reproductive efficiency, mastitis, decreased immune function and 'the full gamut of other diseases typical of early lactation.'" <sup>14</sup> He points to research at the University of Missouri which supports his view that the drug negatively affects many animals' reproductive efficiency and health. It is worth pointing out, however, that mastitis is a very common problem for dairy cows even with-

out bGH, and that the dangers associated with decreased immune function can be minimized with good veterinary care.

Both the proponents and critics of bGH are relying on scientific data taken from experiments lasting only a short term. Until we have studies that look at the longer-term effects of bGH, studies covering several lactations, we will not be able to say with much confidence whether the drug seriously impoverishes the lives of the cows or not. But on the basis of what we do know, it seems reasonable to conclude that bGH is relatively safe for the cows if carefully administered: that is, given for one lactational cycle and then in low doses. Under such conditions, the treatment seems no more inhumane than many other practices typical of modern dairy operations.

This judgment must be set in the context of current conditions, however. We face a period of shrinking profits for farmers; if bGH is readily accessible for as little as fifty cents a dose, it will be used by farmers in many ways. Will it always be used prudently? Once one has invested in the accessories needed to use the drug, will farmers have any incentive to restrict their use to one cycle at low levels? Unless legally required to do so, it is difficult to imagine all farmers using bGH uniformly in the moderate style of the university trials; the financial rewards associated with more intensive usage are too attractive. In the real world of dairy farming, it is improbable that bGH would be restricted to one cycle at low doses. And, we may safely assume that the risk of mistreating animals grows with each level of drug usage.

Further, even if effective regulations controlled abuses, we may ask about the management techniques encouraged by the drug; will dairy cows on bGH be more likely to have access to pasture and open land, or is it more likely that they will be located on intensive operations where almost all of the inputs are purchased and the space allowed for the cows is minimal? Factory farming is already objectionable on the modest philosophical grounds suggested above; will bGH help to alleviate the trend toward treating dairy cattle as nothing more than milk machines on legs?<sup>15</sup> Conceivably, bGH could lead to a decrease in the number of cows in the national herd, and that might appear to ease the need for confinement. But, again, we must match reality against theory; dairy cows are not confined because of the number of them in the national herd. They are confined because the intensive style of modern dairy farming requires easy access to them. The prospect of having to inject the cows with a daily

dose of bGH does not hold out much promise of turning us toward more sustainable agricultural practices or toward a kind of dairying in which animals are treated more humanely.

This objection from humane treatment might lose force if other considerations outweighed it. Do current economic conditions justify the risks associated with bGH usage? If we were at war and milk supplies were endangered, if extreme shortages were anticipated in the short- or long-term, if our children were calcium-deficient because our cows were such poor milkers, then our need to exploit the cows' ability to produce might outweigh the risks to the animals' health. Few would argue, however, that this is the case. In developed countries, there is too much milk, not too little; the United States' Congress is trying to decrease milk production by 8.7 percent by paying producers \$1.2 billion to get out of dairy production. Human need for more cow milk does not outweigh the risks associated with the drug's use.

One might argue that bGH is needed in developing countries. Here we would want to look at the broader problems of hunger and poverty in nations such as Guatemala, Ethiopia, and Bangladesh. Even in places where milk is in short supply, is bGH the right answer? Is a capital- and management-intensive technology an appropriate solution to these countries' complex food problems? The style of farming associated with bGH-usage is more adaptable by *latifundios*, large plantation-like farms, than by smaller independent farms. Yet the smaller indigenous farms hold out the most hope of relieving Third World hunger and poverty. So, even when more milk is needed, the kind of agriculture represented by bovine somatotropin may not be the answer.

If other considerations justify the risks to dairy cattle associated with intense bGH usage, we have not been shown what they are. Lacking any persuasive arguments to that effect, one would have to argue for bGH on even more general grounds; a boycott against bGH would send the wrong signal to industries investing in biotechnology and using animals in their research. Isn't opposition to bGH on humane grounds equivalent to opposition to all recombinant DNA research on animal rights grounds? Clearly not. Unlike most animal rightists, "humane-ists" see potential benefits in genetic engineering of animals. When genes for disease resistance are micro-injected into mice eggs, many of the offspring possess altered immune response systems which gives the children a genetic ability to survive diseases that would kill the parent.<sup>16</sup> Few

genuinely interested in the physical health of animals may object to this result of rDNA research. Biotechnology may enhance an animal's capacity to flourish, and enable successive generations to be less susceptible to disease.

But, again, the abstract potential of biotechnology must be weighed against the realities of the scientific world. Of the many lists stating the explicit goals of biotech research, not one that I have seen includes the claim that biotech is aimed at "improving the quality of animal life for the sake of animals." Indeed, we want to improve animals not for their sake, but for ours. It is only the bodies of animals we are interested in, not their spirits. We want the bodies to be better suited to our interests in milking them, eating them, carving them, chasing them, riding them, hunting them, or using them as factories. Indeed, a good part of the scientific community is presently most interested in producing mice which are naturally susceptible to diseases such as diabetes, cancer, and AIDs, since such animals make better models for understanding the function that genes might play in eliminating disease from humans. These genetically engineered animals are intentionally programmed to lead lives of protracted deprivation or suffering. We are a long way here from engineering animals for increased capacity to flourish. So, while biotechnology has the potential to improve animal life simply for the sake of animal life—and ought to be encouraged for this reason—this sort of research is unlikely to attract the dollars necessary for significant research projects.

The conclusion suggested by this discussion is not one favorable to the marketing and use of bGH. The drug itself is a potential threat to the well-being of the animals as it is likely to be administered to them in doses whose effects are deleterious or unknown. It is also likely to exacerbate the problems involved in the treatment of animals on factory farms. The Wisconsin farmers' first claim—that bGH represents an inhumane method of treating animals—is not without merit for anyone taking seriously the inherent value of animals.<sup>17</sup>

## 2. Social and Economic Effects

The Wisconsin farmers also called for a boycott against the use of bGH on the grounds that it would dislocate too many producers. The argument here cannot be that the technology will put *some* workers out of business; if we were to object to inventions on those grounds we would have had to oppose railroads, electricity, and electronic printing presses. With the introduction of each

of these technologies, blacksmiths, lampmakers, and typesetters were put out of business. Yet society is better off having the advantages brought by computers, rapid transit, and widespread literacy. We should not underestimate the pain involved when workers must move into new professions and neighborhoods. But most of us are willing to accept some costs, as long as they are outweighed by social gains.

Our concerns are raised not when new inventions displace labor, but when new inventions displace labor in ways that seem unnecessary, unfair, arbitrary, or completely unaccompanied by redemptive benefits. People are not infinitely plastic: attachment to place, profession, and way of life is part of human nature. So, even in a market economy in which inventiveness and entrepreneurial independence is valued, it is rational to try to minimize the pain associated with rapid social change, and actively to oppose those changes that benefit only those already most advantaged. Is the new invention needed? If so, how can it be introduced with the least amount of suffering? If not, why is it being promoted and who stands to gain from it? These questions force us to look more carefully at the data about bGH's predicted effects.

Robert Kalter himself has taken pains to point out that his study has been misused by Rifkin. He does not predict that bGH will drive 30 percent of all dairy farmers out of business.<sup>18</sup> He claims that many "technical changes"—including bGH, but not limited to it—combined with the removal of dairy price supports could cause a 25 to 30 percent increase in the nation's milk supply. Since the demand for milk is relatively static, however, this extra milk would not be consumed. Market equilibrium, then, would require a 25 to 30 percent reduction in the number of cows and farms in order to bring supply in line with demand. Since not all farms going out of dairy production would go out of farming, and since bGH is only part of the broader technical change expected in the future dairy industry, Kalter expects that the above scenario might send between 23.3 and 46 percent of dairy farmers out of milking.<sup>19</sup>

But this decrease must be compared to what we can expect for dairying without bGH in its future. If the drug is kept off the market, not all dairy farmers will stay in operation; between 17.2 and 20.4 percent of them are expected to go out of business even if there is no technical change. So the technology itself cannot be held responsible for all of the 23 to 46 percent reduction foreseen by Kalter. How much could be blamed on bGH?

If my reckoning is correct, the figures would be between 15.9 and 25.6 percent.<sup>20</sup>

In New York, there were 17,500 dairy farms in 1984. If price supports are removed, Kalter predicts that the number will fall to somewhere between 12,600 and 15,800 over a three year period, depending on the rate of adoption. This decline of 2200 to 4900 is too conservative by the estimates of Magrath and Tauer (1986: 12). They predict that as many as 5400 farms will fail in New York in that period. But they also point out that over the last 10 years, "conventional technological changes and ongoing structural change has resulted in the exit of 4000 dairy farms." Of course, this still means that bGH would take down more dairy operations in three years than had occurred in the last ten years.

We must also put this prediction in the broader history of declining farm numbers. In the years between 1964 and 1984, the United States saw a decrease of 77 percent of dairy farms and, Kalter points out, "this happened without hormone technology."<sup>21</sup> The decrease is due to a number of factors, but the improved efficiency brought about by artificial insemination, embryo transfer and computerized record keeping play a large role. Since the current "farm crisis" has between 9 and 24 percent of all dairy farmers getting out of the business over three year periods, bGH will only add one to the total. This leads Kalter to conclude that bGH will simply "speed up the process a little."<sup>22</sup>

While Kalter's estimates are more conservative than Rifkin's rhetoric, the figures command attention. And, since so much rests on the accuracy of these figures, a brief consideration of Kalter's methodology is required. Buttell and Geisler (1987) have questioned whether bGH will actually be adopted as quickly and widely as Kalter assumes. They note that he used a mail survey in which information about bGH was included and farmers were asked whether they would use the product described. Kalter's response rate with dairy farmers was only 13 percent, "well below the typical rate of 65 to 70 percent in mail surveys among the general public."<sup>23</sup> A different method was used by the O.T.A.; experts were asked for their judgments about who would adopt the technology. Based on this "consensor" method, sharp disparities were predicted between adoption rates of large and small farmers, with an 80 to 90 percent adoption rate predicted among farmers with over a half million dollars in annual sales, but only 10 to 20 percent among those with less than twenty thousand.

Buttel and Geisler are skeptical about Kalter's results because mail surveys, like personal interviews, do not always give objective results. Respondents "have a tendency to provide responses that they feel the . . . survey authors want . . ." <sup>24</sup> Consequently, among those few who chose to respond to Kalter's survey, most probably did not want "to admit that they [were] inattentive or [would be slow to adopt] new technologies." <sup>25</sup>

The point is well taken. Surveys using more reliable methods are desirable. But the force of the argument is not clear. Is it supposed to show that Kalter's study is methodologically suspect? This might have academic interest, but it would not necessarily invalidate the results. Or is the point that the results are necessarily skewed, and that adoption rates will clearly be much lower? This would have greater relevance for those concerned about bGH, but the authors do not ask us to draw this conclusion. As the authors themselves admit, we have good reasons for suspecting Kalter's methods, but not necessarily his results. Beyond the academic point that Buttel and Geisler have scored, nothing seems to be changed.

The authors have a second argument; Kalter's estimates were skewed upward by the sort of information about bGH given in the mailing. "If . . . hypothetical fact sheets and advertisements" given to respondents "paint a rosy picture of a technology, adoption rates will be biased upwards." <sup>26</sup> Again, this sounds reasonable enough. But did the information in this case actually affect the results? On the authors' own admission, it appears not. As they write: "in contrast to arguments that the rapid adoption rate estimated by Kalter et al. is due to the high return-over-cost margin that farmers would enjoy with BST, studies in Alabama, which gave farmers far less encouraging data, yielded virtually identical rates." <sup>27</sup> Unless I misunderstand the sentence, this bit of evidence confirms rather than repudiates Kalter's study. If a much less rosy picture of bGH does not affect Alabama's farmers' estimates of their adoption rate, why should we believe Buttel and Geisler that "the methodologies used to estimate the configuration of adoption curves have led to some exaggeration of the rate of adoption"? <sup>28</sup>

Buttel and Geisler offer a third argument against the rapid adoption assumption. Smaller, part-time farmers have different criteria for making decisions. Whereas large farmers on the whole try to achieve the highest average rate of profit, smaller farmers often place more emphasis on preserving a certain rotation of crops, or "holding

onto the family farm" for one's son or daughter. "Agricultural census data on smaller, part-time farmers demonstrate well that these farmers' decision-making criteria are not primarily those of maximizing returns to equity capital." <sup>29</sup> Since decisions are made on different bases, we should not assume that all dairy farmers will value equally the increased efficiencies found in bGH.

This is another valid point. It is a too little appreciated fact that Amish farmers refused to adopt no-till farming techniques not only on religious or environmental grounds, but because it would mean fewer Amish sons would need to be employed in farming. <sup>30</sup> Few commercial farmers would consider such a factor to be relevant to their business decisions, but the fact that some Amish did indicates the diversity of decision-making criteria among farmers.

If the general point is right, it is again difficult to see its relevance to Kalter's estimates. Small farmers may gather in Wisconsin and state their opposition to bGH. But what these small farmers say they would like to do as a collective group is not the same thing as what they will do as individual operators. The Wisconsin farmers do not want bGH because it will drive some of them out of business. But they know as well as we do that if the coalition fails in its goal to keep bGH off the market, most of them will be forced to use it if they want to stay competitive. These are well-informed and politically astute farmers. But they are also financially stressed. So even if they have different decision-making criteria and express these as a group, when it comes to saving their operations, they will act just like the big producers. A survey in Wisconsin showed that while two thirds of farmers said that they did not want bGH, most of those same farmers said that they would use it if it were made available.

There are no good philosophical reasons to doubt Kalter's estimates. Even on the most modest of assumptions, then, technical change (of which bGH will be a large part) will be responsible for increasing the expected rate of farmers leaving dairying. Without bGH we can expect at least 17.2 percent of farmers to go out of business. With it, that figure rises to at least 23.3 percent. Notice, however, that this is an increase of some 33 percent in the number of farm failures. (The number could go as high as 120 percent. Using Kalter's figures for a low inelasticity of demand and a high rate of technical change, farm failures could go from 20.4 to 46.0 percent, an increase of over 100 percent.) If Kalter's numbers seem reliable, then we might wonder at his judgment. Is a

33 percent increase in the number of dairy farmers forced out of dairying to be interpreted simply as “speeding up the process *a little*”? In a time of milk surpluses and rural crises, are these additional failures needed? Is it fair to ask a very small percentage of society to bear all of the costs for a marginal increase in the efficiency of milk production?

Now, someone might respond to this argument by admitting that even though we do not need bGH, we should not try to keep it off the market; doing so would put a chill on future industry investment that could cause our country to fall behind others in the biotech race. For the vice president of Monsanto, “the choice is clear: Either be an innovative farmer or compete with one.” Howard Schneiderman wants American agriculture to have the “innovative edge” on other farmers around the world, claiming that “If we do not continue to innovate, we will be forced out of business.”<sup>31</sup>

The answer to this worry is painfully obvious; it is most improbable that American businesses will pull out of a race for \$40 billion in prizes just because they see an obstacle on the track. Corporate America is much better at jumping hurdles than the vice president of Monsanto gives it credit for being. Its lawyers are very good at anticipating and responding to legislative and judicial constraints. Its marketing analysts are very good at figuring out what sorts of products consumers want and do not want. Its scientists are very good at identifying and locating various genes of agronomic and economic importance. So those wishing to stop bGH are no threat to the Monsantos and Eli Lilies of the world. The argument that stopping bGH will put a chill on research is not only unpersuasive, it demonstrates a lack of confidence in a large and resourceful industry.

Part of the problem with bGH is that it appears to discriminate against small and medium-sized farmers, the same farmers who helped to pay for research on it. The genetic engineering techniques that industry will use in making the protein were perfected at universities like Cornell using public monies. And, in research funded jointly by Monsanto, dairy scientists at that school tested the validity of the drug while agricultural economists at Cornell devised econometric models to gauge its market viability and impact. In both indirect and direct fashion, the potentially displaced farmers paid monies for public research which, in turn, led to private sector developments that promise to put them out of business. Many of these farmers have families that have been in the dairy business for generations. *Prima facie*, then,

they are justified in believing they have been treated unfairly.

Assessing the deeper merits of this belief, however, is no simple matter. There are several problems here, touching on issues of fundamental disagreement between social philosophers. What is distributive justice in economic matters? What does it require in this case? Don't the greater benefits brought by the free operation of markets outweigh the social costs incurred in the constant shifting of labor resources in capitalism? If so, isn't bGH really for our common good, even if it displaces one fifth of all our dairy farmers?

Before taking up these questions I want to lay my cards on the table. It is my intuition that the Wisconsin farmers are right; something about bGH's social and economic effects is objectionable. On examination, however, I have found it very difficult to say exactly what that is. No laws have been broken, no contracts circumvented, no federal regulations ignored. Not even Jeremy Rifkin claims that any legal damages have yet been done to any party. So the “injustice”—if we are to call it that—is taking a very strange form. None of it has happened: the 15.9 to 25.6 percent of dairy failures-due-to-bGH are hypothetical (even if probable) *future* events.

If the oddness of this case tempts us to throw up our hands we will have to resist; if we ever needed a language in which to discuss “potential future injustices” it is now. The skill of social scientists to make sensitive ex-ante studies about the likelihood of various consequences of new technologies grows. As it does, their sophistication in predicting the future quickly surpasses our ability to assess the results of their studies morally. And yet—if it is in our power to do so—it is surely better to prevent an injustice before the fact than to try to remedy one after. So the urgency of trying to assess the farmers' second charge is as great as the conceptual difficulties involved in doing it.

If bGH is unfair to farmers, it is not yet clear how or why. We might begin by specifying the group that, at some future point, is supposed to be the one offended. According to Kalter, bGH is size-neutral; it can be used by farmers whether they have “ten cows or a thousand.”<sup>32</sup> Contrary to the claims of bGH's proponents, however, many studies have contested the claim that bGH is size-neutral; the winners and losers will not be evenly distributed throughout the farming population.

Even though bGH may be marketed at a low cost per dosage, successful use of the product will require significant managerial expertise and access to capital. “These constraints,” write Barnes

and Nowak, “will be most problematic for smaller and less efficient farms that have operators that are less knowledgeable and older.”<sup>33</sup> They point out that there are “substantial differences among [dairy] operations” in ability to use bGH.

For example, the managerial constraints (forage testing, ration balancing, and DHI records) became more problematic as the age of the respondent increased, and the average pounds of milk (cwt) sold, number of cows in the operation, and rolling herd average all decreased. To the extent that the use of bGH will require these managerial inputs, then operators or operations with these characteristics will either not use it or use it in an inefficient manner.<sup>34</sup>

A new technology is not size neutral when its cost-effectiveness improves as the number of cows and the quality of managerial skills increases. And yet, even if individual doses are priced low, larger and younger and better educated farmers will reap disproportionately greater benefits than older, less “aggressive” farmers. bGH is not size neutral.

Fred Buttel goes even further, asserting that it is difficult to imagine any agricultural biotechnology that would be scale-neutral.

Scale neutrality of a technology is often taken to mean that the technology will have no impact on the size distribution of farms when, in fact, few new agricultural technologies are neutral in their impacts on farm size distribution. . . . The essence of technological change is the substitution of relatively cheap, abundant factors or means of production (e.g., bGH) for relatively expensive, scarce factors (e.g., land, cows), along with new management or organizational means for altering the mix of input factors. . . . A new technology such as bGH requires [my emphasis] substantial managerial expertise for its successful adoption by farmers, and if farmers vary substantially according to scale of production in their management expertise, the technology is, *a priori*, *nonscale-neutral* [Buttel’s emphasis].<sup>35</sup>

Traditional patterns of technology adoption suggest that larger, more “progressive” producers take earlier advantage of innovations, reaping whatever rewards there might be in increased efficiency. When the rest of the group catches on, these comparative advantages fade. In the case of bGH, early adopters will probably be those dairy farmers with large pedigreed herds, with significant investments in manage-

ment and labor, access to capital, and low debt-loads. They will be the winners. The losers will be those with high debt-loads or poor soils or small herds or so-called bad management techniques, the producers that the agricultural establishment sometimes calls “inefficient.” These are likely to be subsistence farmers in Appalachia, black farmers in the South, and medium-sized farms with high debt throughout the country. They will be the losers.

Have the losers been treated unjustly by the agricultural research establishment? An answer to this question requires us to define justice, no easy task. Many definitions have enjoyed favor throughout the centuries of reflection on the matter, but three considerations seem to recur in all of the discussions: equality, contribution, and need. Following contemporary philosophical practice, I will discuss these issues under the headings of distributive justice and the common good.

### 2.1 Distributive Justice and bGH

The argument from unequal treatment assumes that there is an unwritten contract between agricultural research institutions and the farmers who support them. The farmers pay taxes which go for salaries and equipment; the institutions are supposed to deliver seeds, machines, and techniques that will make farming more productive and profitable for all kinds of farmers. Now, if institutions do research that speaks only to the needs of a certain class of farmers and thereby gives them a comparative advantage over others, then the contract has been broken. The institutions have unfairly privileged one class, and put another at a disadvantage.

There is strong evidence for thinking that smaller and larger-sized farmers have been treated differently. Jim Hightower’s book *Hard Tomatoes, Hard Times* popularized the case of the mechanical tomato harvester in California, and the ongoing California court case that resulted from it is adding the weight of legal opinion to Hightower’s charge.<sup>36</sup> Of course, some benefits have accrued to small and medium-sized farmers from the university research in question, and these need to be added into the calculus. Nonetheless, when one considers the kinds of technologies that have come out of agricultural research institutions since the second World War—including, but not limited to, chemical herbicides and pesticides, large tractors and implements, automated milking parlors, artificial insemination, petroleum fueled machines, embryo transfer, and hybrid seeds—a presumption in favor of Hightower’s charge appears. Even farmers themselves tend to



think that their own farms always need to be a little bigger; there is an ideology of growth in farming that has been caused by, and in turn helps to fuel, institutional research biased toward large-scale, capital-intensive, mechanized agriculture. So the ball is in the opponent's court; the burden of proof is on those who believe that small and medium-sized farmers have *not* been discriminated against.

One might argue that the skewing of research was justified because large farmers assumed a larger share of the tax burden. If the more aggressive operators had paid substantially larger sums, wouldn't they be entitled to the increased attention they received? Even if it were true that big farmers had shouldered most of the burden, this would not justify an unbroken legacy of hard tomatoes and hard tomato harvesters. Which innovations favored smaller producers? Which hybrid seeds, which machines, which chemicals gave assurance that farmers could remain competitive while retaining their present size? Even Extension has focused on the "progressive" farmers in a community in the apparent hope that benefits would trickle down to others. Thus, even if large farmer had paid the largest taxes, this would not justify the extent of research bias. And it is still to be shown that big operators did in fact contribute more.

The severity of this research bias would be of one magnitude if small and medium-sized farmers had simply not been able to increase their profits. But the situation is much worse; these farmers have not remained where they were; they have gone through years of financial and emotional upheaval. Many have ended in bankruptcy. As the farm crisis drags on, successive groups of farmers are moved toward the end of a conveyor belt, and dumped over the edge. The machine is not broken; it is moving. With each new jerk of the belt, the *status quo* is changed. Those farmers with the most comparative advantage in the first round are quite safe; they are not on the treadmill, and continue to prosper from each new round of innovations. Meanwhile medium-sized farmers struggle to get bigger. A few succeed; the rest are dumped. Insight into this chronic cycle may have caused Earl Butz to tell farmers to get big or get out, but it also lies behind the O.T.A.'s much-cited prediction that medium-sized farms will have completely disappeared by the year 2000.<sup>37</sup>

Doesn't the rapid growth of small farms also predicted by the O.T.A. give evidence that the research establishment has not favored large operations? No. Small farms are flourishing not because they are efficient at producing food, but

precisely for the opposite reason; their efficiency at producing food does not particularly matter to them since this is not their primary source of income. Indeed, the growth of small farms contributes to the demise of traditional family farms because their willingness to accept lower prices for their products depresses the prices received by those trying to make a living primarily from their farm.

The extent of the unfairness cannot be seen if one takes a snapshot of the conveyor. The belt is turning, and with each turn, a new group of farmers is dumped off the end. When, as David Braybrooke puts it, "the game begins again," the terms are different. If the results of the last exchange "were unjust, enriching some people at the expense of others, and there are no compensating changes, they bring about a distribution of resources (in private property and in other resources like influence) that raises the prospects of injustice" in the next round of exchanges.<sup>38</sup> As large farmers increase and consolidate their hold on the industry, the universities become even more responsive to their needs, and to the needs of the private sector food processors who prefer to deal with a few large producers. Meanwhile, governmental programs also become increasingly biased toward the larger producers: the amount of governmental assistance provided to large farms increased tenfold between 1980 and 1985, while the assistance given to medium farms increased only fivefold.<sup>39</sup>

The consequences of such unfair exchanges may be even more troubling than the initial injustices. Not only have the medium-sized farmers lost the value of their tax dollars, but they have also given up what Braybrooke calls "increments of power and advantage"<sup>40</sup> that they would have had if the first round had been fair. Their ability to educate themselves about new farming methods, their incentive to organize into effective political units, their skill in bargaining collectively, their capacity to market their goods strategically—all of these skills may suffer serious erosion as a result of the group's having been mistreated in earlier stages.

Whether my theoretical analysis offers a sufficiently nuanced explanation of the history of America's medium-sized farms is arguable. It is admittedly schematic and general. But studies have given us good reasons to believe, more specifically, that 1) prices received by hog and beef farmers in certain portions of the country are artificially lowered because of lack of competition among meat packers in those regions,<sup>41</sup> 2) a concentration in the number of firms in breakfast

cereals has artificially inflated prices paid by consumers,<sup>42</sup> 3) that tax laws like rapid depreciation schedules and investment tax credits have favored large producers over small producers,<sup>43</sup> and 4) that the land-grant university system has not taken care to make sure its research is equally beneficial for all sizes of farms.<sup>44</sup>

This illustrative list of problems may or may not add up to a longstanding pattern of discrimination by powerful, tax-funded, organizations against the majority of farmers. But the case against bGH does not stand or fall with the answer to that question. Suppose that the process of allocating tax monies for research is judged, as Luther Tweeten argues, not to have been biased against family producers.<sup>45</sup> We must still ask ourselves whether the general pattern of the demise of moderately sized farms is socially desirable. In 1986, 6 percent of all farmers went out of business; one farm every four minutes. In 1985, the figure was 5 percent. If those figures seem small compared to the general rate of failures of small businesses, consider that most small businesses have only very recently started-up; the farms in question often go back generations. These farms do represent, in the often maligned rhetoric of farm activists, a "way of life" whose value is not measurable in economic terms.<sup>46</sup>

The loss of farmland owned by minorities plays a disproportionately large role in this story. Half a million acres of farmland per year are currently being lost by black owners. The story started, of course, with blacks clearly behind the eight ball; while they constituted approximately 15 percent of the U. S. population, blacks owned almost no farmland at the beginning of the twentieth century. Currently they own 1.4 percent of the farms. Whatever progress black farmers have made, however, is being rapidly eroded. At the current rate, these farmers will be completely landless again by the end of the century.

What is happening to the land? Patterns of land-use vary across the country, but in places where conversion to nonagricultural uses is least problematic, the number of absentee landowners is increasing dramatically. In 1981, the number of acres managed by professional farm management companies was 48 million; in 1986, it was 59 million, an area the size of Colorado.<sup>47</sup> While it is not clear from the data which farms in particular are under the most pressure, it is clear that 66 percent of total farm debt was held in 1986 by medium-sized farms, those usually owned and operated by families who are dependent on them as their major source of income. These are the

farms currently closest to the end of the conveyor belt.<sup>48</sup>

What does this story about publicly funded agricultural research and its effects on rural America have to do with bGH? It helps us to see the broader pattern of which bGH is a continuation. If hardships were distributed evenly, if large and small and medium-sized farms—those owned or worked primarily by blacks, whites, and hispanics—had all suffered equally in this tale, then we would have little basis for talking about injustice. But gross discrepancies have been with us for a long time, through several turnings of the belt, and those dumped off the end have not been compensated.

In terms of disparity in income levels and access to power, the situation in agriculture is little different from the wider pattern in the United States. In 1970, the top 20 percent of Americans made 41.6 percent of total family income; the bottom 20 percent made 5.5 percent.<sup>49</sup> By 1985, the top 20 percent were capturing an additional 5.5 percent—up to 47 percent of all earned income—while those on the bottom had dropped to 4.7 percent.<sup>50</sup> Of those working for a living, the most successful in our culture make somewhere in the range of 100 to 200 times the amount of the least successful.<sup>51</sup> What is the annual income of the CEO of Cargill or Beatrice Foods compared to the income of a migrant worker in Muscatine, Iowa? Suppose, conservatively, the CEOs make \$500,000 per annum, while musk melon harvesters garner \$10,000. The difference here is not on the order of 200 or even 100, but of 50. And yet we ask: Is even this discrepancy justified?

Perhaps the CEOs deserve more, or need greater incentives to do their jobs well? This is difficult to believe. Are we to suppose that the corporate director exerts more physical energy or has longer hours than the fieldworker? Or that the CEO must take more risks? Is the CEO worth more to the vitality and growth of our economy? Of all the possible justifications, this last one is the only one that comes close to being credible. And yet even if we accepted it (which I am not recommending) would it justify the magnitude of difference? Perhaps so, if we could argue that being the leader of a corporation entails greater psychological stress, and that people would not take up this line of work unless the incentives were as great as they are. But people go into equally stressful lines of work (such as air traffic control) for only four or five times the income of migrant workers. So the argument from incentive

will not work; capable people will flow into stressful jobs for much less than a half a million a year. Perhaps agribusiness leaders need extra intelligence that, say air traffic controllers do not need. But equally intelligent people work in factories and universities and laboratories for, again, a tenth of the CEO's salary. The fact is that there are no persuasive moral arguments to justify the current inequities in pay found across the range of jobs in agribusiness. And the inequities are growing worse.

If the discrepancies were temporary abnormalities we might be able to overlook them. But to the extent that they are deeply entrenched in our history and likely to persist indefinitely, they indicate a troubling problem in our agricultural market system. For it is, in Braybrooke's words, "the continual repetition of the discrepancies, with one set of people always faring well, and another always faring badly" that fixes our attention. "Some people, and their children, [are] living their lives out—very possibly shortened lives—without having any chance to live decently; others [are] surfeited with pleasures."<sup>52</sup>

We might defend the agricultural market system by arguing that discrepancies of some magnitude are inevitable in any system of allocating resources, and that the agricultural market system could alleviate gross discrepancies by redistributing resources downward—toward those on the bottom—through political measures such as progressive income taxes. In this case, income transfers (for example, via a truly progressive income tax system) from rich CEOs and agribusiness corporations to seasonally employed migrants and poverty-level farmers would be justified on the grounds of equality and need.

This would be a step in the right direction, but the poor need more than income; they need autonomy, meaningful employment, jobs in which their skills can be used and honed and which help to give them control of their lives. The poor need jobs and education through which to be able to meet their own needs for food, shelter, clothing, and companionship. Farming in the traditional sense has offered that sort of employment. The farmers being put out of business by technological advances do not need income enhancements in the long run. They need secure employment. Thus the answer suggested by Michael Novak—to give farmers cash—may show compassion, but it is not directed toward establishing an agricultural economy that plans rationally and deliberately for just compensation of its members.<sup>53</sup>

It may be objected here that my analysis assumes too much control over the inventive pro-

cess. How can we *plan* to come up with innovations that would help smaller full-time farmers? How could anyone hope to direct the scientific imagination in such a direct way? If this sounds difficult, we need only to look again at the history of agriculture. Contrary to popular mythology, new inventions do not come out of thin air, or from lonely wild-eyed geniuses. Inventions are consciously and rationally pursued by those who have the most to gain from them. Research leading to the invention of the milking parlor did not begin because farmers went on a general strike against milking by hand. It began, in part, because milk processors had an interest in buying milk from as few farmers as possible; they funded research and supported public policies that would help their largest suppliers increase productivity and efficiency. Research on hard tomatoes did not begin because a groundswell of consumers decided they would like dull tasting, thick-skinned vegetables. It began because food handlers wanted to be able to purchase tomatoes in large quantities and to ship them long distances to markets. Research on herbicide-resistant corn has begun not because farmers want to put more powerful chemicals on their fields but because, in part, chemical companies have bought seed companies and want to market an integrated all-Dow or all-Monsanto seed-and-chemical package.<sup>54</sup> Research on bGH may have begun, in part, because scientists were interested in the molecular structure of a specific protein, but it has been pushed through to the marketing stage only by the corporations anticipating significant profits. Expensive biotechnologies do not blossom from people's heads as if they were fresh flowers seeking spring air; they are consciously pursued by powerful organizations with specific plans and needs. This proves that we can and do direct the course of technological invention.

Those who say that "the development of technology" is primarily responsible for the decreasing number of dairy farmers may not intend to mislead us, but they do so when they allow their audiences to infer that history could have followed no other course. In fact, we could have pursued other economic, monetary, and fiscal policies; we could have encouraged farm organizations and cooperatives instead of subsidizing production of targeted crops; we could have concentrated on diversifying our farms instead of concentrating production on a few export crops; we could have invested in other sorts of research in agriculture—perennial crops, sustainable farming methods, small-scale, non-chemically driven planters and reapers. Those who have the most to gain from

large, intensively-managed, petro-chemically dependent methods in farming have played a substantial role in the displacement of farmers, and we should not allow fatalistic rhetoric about the past "development of technology" to hide this fact.

Similarly, those who say that "market forces" such as high input costs (for seed, fertilizer, labor, and operating loans) and low market prices have displaced farmers may also mislead us. Input costs are directly affected by fiscal and monetary policy; when a nation runs large budget deficits it is more difficult to make money available to small-scale entrepreneurs. When it pursues policies that make its currency strong, it negatively affects export-sensitive industries such as agriculture. "Market forces" are no more natural than the paths of technology development. To talk as if they were is to engage in the same sort of deterministic thinking we saw above.<sup>56</sup> We could collectively decide to change our military budget, tax cuts for the wealthy, schemes for union-busting, and refusal to enforce anti-trust laws. If we did, the climate for small-scale businesses such as family farms and ranches would be much different.

## 2.2 bGH and the Difference Principle

How should we go about distributing the benefits of technology? John Rawls suggests that social goods should be distributed fairly, and that inequities in distribution should be accepted only when such inequities will enable those on the bottom to be better off than they would have been if the inequities were disallowed.<sup>56</sup> This is the difference principle: unequal distribution of material goods and social status is fair if and only if it improves the lot of those on the bottom. Poor farmers in the South might be denied certain tax breaks given to bigger farmers if and only if the poorer farmers would come out ahead in the long run. Black farmers might be denied Extension Service attention if and only if this would result in their farm operations improving over the long haul. A progressive tax system would be justified, even though it appears to treat the wealthy unfairly, if and only if it improves the condition of the worst off.

Knowing what we now know about bGH, could we justify denying industry and large farmers profits on the grounds of distributive justice to smaller farmers? Advocates would say no; keeping bGH off the market is unfair to some farmers because it denies them the choice of using it. But, according to the difference principle, this could be justified if it would improve the lives of agriculture's most disadvantaged.

Would a boycott of bGH improve the lot of the

worst-off dairy farmers? There are at least two questions here. The first is: Would banning bGH really be good for the marginal farmers? Lester Thurow argues that while there is an excess of farmers, there is also plenty of good jobs into which they could move.<sup>57</sup> Rather than artificially trying to save farmers' jobs, society would be better off retraining the farmers, helping them to make the transition into other lines of work. This argument makes sense if we look at the history of farming through deterministic glasses. If the labor requirements of agriculture have been reduced by inevitable, inexorable, forces, then it is foolish to try to retain workers in farming today. Too many inefficiencies in the allocation of resources are promoted by trying to keep farmers employed.<sup>58</sup>

Laying aside for the moment questions about the validity of this view of history and the psychological costs involved in a farm family's leaving its homestead, we may still ask whether the argument above takes into account all of the external economic costs involved in moving labor out of agriculture. At the environmental level, what is the cost in soils and water when fewer farmers, increasingly dependent on pesticides and herbicides, increase their landholdings? In many areas, profligate use of marginal lands by farmers intent on increasing the size of their fields in order to use large equipment more efficiently has rendered thousands of acres virtually unusable and unrecoverable. At the national security level, what is the cost of having more and more of our corn crop in less and less diversified species? In 1970 the United States lost 15 percent of its corn crop to Southern Corn Leaf Blight due to the uniform nature of the seed used across the corn belt.<sup>59</sup> At the aesthetic level, what do we lose by no longer being able to see countrysides of well-kept farmyards, gardens, and animals in pasture?<sup>60</sup> At the strictly economic level, how much does it cost each taxpayer when one displaced farmer moves into an urban area, fails to find a job, goes on unemployment, and eventually loses incentive to look for work? What human resources are lost in the process? How many tax dollars are spent on Medicare, public nursing, pharmaceutical products, and federal programs in order to care for that farmer? What social costs are incurred by the depopulation of rural areas, the overcrowding of cities, and the malaise and disruption that accompany both?

The fact is that we do not have any idea about the extent of the external costs involved in moving labor out of agriculture. We lack accurate accounting methods "that begin from the assump-

tion that social costs are to be computed so that the public has a far more exact understanding of what any particular item or process costs the society as a whole."<sup>61</sup> So I would not presume to be able confidently to assert that the costs of moving farmers out of their way of life outweighs the benefits of doing so; I have no more privileged way of judging this matter at present than anyone else. What can be asserted, however, is that those who think that they can boldly claim that "retraining farmers" is the only sensible answer to the farm crisis are either naive or privy to divine revelation.

The second question is whether "banning" bGH would be good for the urban poor, many of them grandsons or granddaughters of farmers. A successful boycott against bGH might prevent the lowering of milk prices, or even slightly inflate them and, moreover, have a chilling effect on other avenues of research in industry and university, avenues that might lead to cheaper food for the poor. Advocates of bGH claim that the new biotechnologies will cut costs for farmers, and that these will be passed on to consumers. History, again, is a good antidote for such rhetoric. In recent years farmers have been pressed to cut their input costs while the prices they received on the market for their wheat, corn, and beans dropped steadily. Did the price of corn flakes to consumers drop? During the summer of 1988, many food manufacturers raised prices at the first media stories of the drought. Their costs, of course, had not gone up; they simply used news reports as cover for increasing profits. The facts are that intermediate markets seem to have a way of absorbing whatever profits are made when farmers' prices go down. There is no reason to think that bGH usage would lower milk prices for the urban poor, or any consumers.

### 2.3 bGH and the Common Good

These considerations compel us to think not simply about distributive justice, but about wider considerations such as the sort of people we are and want to be, the qualities of character we want to encourage in our young, and the type of concerns we wish to pursue together. Our society should be one in which no person goes hungry, in which all who wish to work are employed—in jobs promoting individual autonomy and social cooperation—and in which human flourishing in its moral and spiritual sense is possible. We should pursue objectives that are good, in an objective, substantial sense; objectives that allow us "to experience the fullness of human life, as opposed to merely existing."<sup>62</sup>

From the perspective of the common good, bGH appears as a technology that not only will fail to promote the common good, but will actively undermine it. It will only add to a decline in the number of dairy farmers, exacerbating the crisis currently affecting rural America. It will degrade rather than enhance the internal goods pursued in the practice of farming since it encourages farmers to treat animals as production machines rather than co-inhabitants.<sup>63</sup> It promises to assimilate dairy farming fully into an impersonal, industrialized culture that farmers have long resisted. In short, bGH threatens to undermine the common good not simply of the dairy farmers it will displace, but of us all. It promises, in a small way, to undermine our general well-being.

That conclusion is worth pondering, and its qualifications are worth repeating. bGH *promises* (we should not forget that we are dealing with potential injustices, not yet realized) *in a small way* (it is by no means the world's most pressing problem, nor even the most important problem for America's small dairy farmers) *to undermine* (not simply fail to promote) *our general well-being* (it is not simply dairy farmers who are affected, but all of us).

After all of this, defenders of the technology would still have the following response open to them. If we prevent bGH from reaching the marketplace, we may be sending a signal to farmers that inefficient farming is acceptable, and that society will always protect them from innovations that might displace them. This would be counterproductive for society as a whole, making farming a less attractive line of work for farmers, and driving up the cost of food for consumers.

The objection has merit, and it forces us to admit that we walk a fine line when we get in the business of trying to pick and choose between new technologies. We do not want to stifle the imaginative spirit of public or private scientists, nor the independence of farmers for whom farming is attractive precisely because it allows them freedom to try new things. But while bGH is the first agricultural biotechnology, it will not be the last. And discouraging its use in no way commits us to oppose all technologies. We should oppose only those technologies that unfairly advantage one social group over another, that displace workers at unacceptably high costs, or that threaten the stability, beauty, or integrity of the plant or animal kingdom.<sup>64</sup>

### 3. Policy Recommendations

In the interests of the common good, we ought to pursue at least two goals in agriculture. One is

to keep farming open to a wide number of people. The second is to allow innovations that will contribute to the number of meaningful jobs. Accomplishing this goal means matching supply with demand. The free market has not demonstrated the ability to do this in the dairy industry. When left to market forces, dairy farmers—like all farmers—have, in the words of John Kenneth Galbraith, “a relentless and wholly normal tendency to overproduce, because of extraordinary productivity gains and because farmers, being powerless to influence or control supply and price, harvest more and more as a way of trying to stay financially afloat.”<sup>65</sup> As Galbraith argues, the answer is a system of supply management, something that is “taken for granted in all large-scale industry.”<sup>66</sup> We need a way to organize dairy farmers so that each can make a decent living in a relatively stable business atmosphere without relying on government subsidies or having to try to outproduce one’s neighbors. That is a tall political order. My contribution here is only to suggest that bGH—and the sort of technological direction represented by it—is of no help in trying to fill it.

#### 4. Conclusion

To the extent that potentially displaced dairy farmers have done nothing for which they ought to be punished; to the extent that the research establishment has clearly favored large producers in its development of techniques and technologies; to the extent that fiscal, monetary and economic policies have disadvantaged small dairy producers; and to the extent that bGH will only exacerbate the unjust consequences of the past; to that extent we ought to oppose this particular biotechnology. Language about “banning” bGH, of course, is just that: a slogan intended to summarize the case against bGH. There is no governmental body with the authority to ban bGH on the grounds of humane treatment of animals. Nor is there any government agency charged with the task of overseeing—much less regulating—technologies by the criteria of their anticipated socio-economic effects. This shows the need for legislative attention to this matter. But in the meantime, opposition to the marketing of bGH sends a signal to those in public and private decision-making positions. Not all biotechnologies are acceptable. We do not want those that are destabilizing, inhumane, or ugly; we do want those that will preserve the beauty, integrity, and diversity of the Creation.

Jewish folklore tells of the legendary town of Chelm, the inhabitants of which engaged in the most curious behavior, always doing the opposite

of what was in their interests. Knowing full well that the rainy season was upon them and that the prayer hall desperately needed a new roof, they spent all their time putting new carpet on the floor. The next fall, when their schoolchildren had no papers, pencils, or workbooks, they spent their entire fortune on another first edition for the rabbi’s library.

However fascinating fiction may be, contemporary agricultural history is more astonishing. Awash in excess dairy products, our government dumps milk in the ocean, hands out surplus cheese to farmers, and pays operators \$1.2 billion to slaughter their cows: all of this while publicly funded institutions are quietly spending taxpayers’ monies on schemes to increase milk production. There are daring scientific projects that are in our own interests, and that need our moral encouragement. bGH is not one of them.<sup>67</sup>

#### Notes

1. Hans Jonas, *The Imperative of Responsibility: In Search of an Ethics for the Technological Age* (Chicago: University of Chicago Press, 1984): 203.
2. Matthew H. Shulman, “Bovine Growth Hormone: Who Wins? Who Loses? What’s At Stake?” in *Agricultural Bioethics*, D. Kline et al., eds. (Ames: Iowa State University Press, forthcoming): 23.
3. “Experimentally, the greatest response on an annual basis has been a milk increase of 25.6 percent,” Kalter, et al., *Biotechnology and the Dairy Industry: Production Costs, Commercial Potential and the Economic Impact of the Bovine Growth Hormone*. A. E. Research 85-20. Ithaca: Department of Agricultural Economics, Cornell University, 1985: 108. This increase is not expected over the animal’s complete lifetime. See D. E. Bauman, P. J. De Geeter and G. M. Lanza, “Responses of High Producing Dairy Cows to Long Term Treatment with Pituitary- and Recombinant-Somatotrophin,” *Journal of Dairy Science* 68 (1985): 1352.
4. Howard Schneiderman, “Innovation in Agriculture,” *The Bridge* (Spring 1987): 5.
5. See Shulman, *op. cit.* and Laura Tanglely, “Biotechnology on the Farm,” *BioScience* 36 (October 1986): 590-593 and (November 1986): 652-655. At its 1986 annual meeting, the New York State Grange decided to oppose the commercialization of bGH until seven areas had been studied. These included the three areas cited by the Wisconsin farmers.
6. Quoted in Shulman, 13. How the agency could confidently conclude that “the investigational use of (bGH) in dairy cows does not result in significant impacts on the human environment” without having run its own tests is less than clear.
7. In addition to the works already cited see, for example, Frederick H. Buttel, “Agricultural Research and Farm Structural Change: Bovine Growth Hormone and Beyond,” *Agriculture and Human Values* 3 (Fall 1986): 88-89; Buttel, “Biotechnology and Agricultural Research Policy: Emergent Issues,” in *New Directions for Agriculture and Agricultural Research*, K. A. Dahlberg, ed. (Totowa: Rowman and Allenheld, 1986): 312-347; Buttel, “Biotechnology and Public Agricultural Research Policy,” in *Agricultural Science Policy in Transition*, V. J. Rhodes, ed. (Bethesda: Agricultural Research Institute,

- 1986): 123-156; Buttel and Charles C. Geisler, "The Social Impacts of Bovine Somatotropin: Emerging Issues," paper prepared for the National Invitational Bovine Somatotropin Workshop, sponsored by the Extension Service, U.S.D.A., St. Louis, September 22, 1987; William P. Browne, "Bovine Growth Hormone and the Politics of Uncertainty: Fear and Loathing in a Transitional Agriculture," *Agriculture and Human Values* (Winter 1987): 75-80; William P. Browne and Larry G. Hamm, "Political Choices, Social Values, and the Economics of Biotechnology: A Lesson from the Dairy Industry," staff paper 88-33, April 1988, Department of Agricultural Economics, Michigan State University; D. L. Heuth and R. E. Just, "Policy Implications of Agricultural Biotechnology," *American Journal of Agricultural Economics* 69 (May 1987): 426-431; R. J. Kalter, "The New Biotech Agriculture: Unforeseen Economic Consequences," *Issues in Science and Technology* 2 (1985): 125-133; Kalter, et al., *Biotechnology and the Dairy Industry: Production Costs and Commercial Potential of the Bovine Growth Hormone*. A. E. Research 84-22. Ithaca: Department of Agricultural Economics, Cornell University, 1984; R. J. Kalter and R. A. Milligan, "Emerging Agricultural Technologies: Economic and Policy Implications for Animal Production." Manuscript, Department of Agricultural Economics, Cornell University, 1986; R. J. Kalter and L. W. Tauer, "Potential Economic Impacts of Agricultural Biotechnology," *American Journal of Agricultural Economics* 69 (1987): 425-430; J. Kloppenburg, Jr., "The Social Impacts of Biogenetic Technology: Past and Future," in *Social Consequences and Challenges of New Agricultural Technologies*, G. M. Berardi and C. C. Geisler, eds. (Boulder: Westview Press, 1984); W. B. Magrath and L. W. Tauer, "The Economic Impact of bGH on the New York Dairy Sector: Comparative Static Results," *Northeastern Journal of Agricultural and Resource Economics* 15 (1986): 6-13; and R. C. Barnes and P. J. Nowak, "Bovine Somatotropin's Scale Neutrality and Constraints to Adoption." Manuscript, Department of Rural Sociology, University of Wisconsin, 1987.
8. Patrick Madden and Paul B. Thompson have addressed the general issue of ethics and agricultural biotechnology in "Ethical Perspectives on Changing Agricultural Technology in the United States," *Notre Dame Journal of Law, Ethics and Public Policy* 3 (Fall 1987): 85-116. But they are not concerned with bGH specifically. I find their argument marked by a puzzling ambiguity. In the first half, the agricultural market economy is assumed as a given, and never questioned. The second half describes strong ethical criticisms of that assumption, drawing on the work of E. F. Schumacher and Wendell Berry. Unfortunately, the authors do not show how the challenges raised in the second half of the essay might lead one to revise fundamental assumptions in the first.
  9. Tangle, 590.
  10. Tom Regan, *The Case for Animal Rights* (Berkeley: University of California Press, 1983).
  11. See Ned Hettinger, "Cohen on the Use of Animals in Biomedical Research," manuscript, Department of Philosophy, Charleston College, Charleston, SC. Hettinger is responding to Carl Cohen, "The Case for the Use of Animals in Biomedical Research," *New England Journal of Medicine* 315 (1986): 865-870.
  12. Among others, Frederick Ferre holds such a view. See "Moderation, Morals, and Meat," *Inquiry* 29 (1986): 391-406. My criticism of Regan is indebted to Ferre's discussion.
  13. Don Beitz, "Physiology of Growth Hormone," lecture to Animal Science Roundtable, Iowa State University, May 13, 1988.
  14. David S. Kronfeld, quoted in Shulman, 14.
  15. For a description of conditions on factory farms, see Peter Singer, "Down on the Factory Farm," in *Animal Rights and Human Obligations*, Tom Regan and Peter Singer, eds. (Englewood Cliffs: Prentice-Hall, 1976).
  16. In addition to the work of Phil Leder and his lab at Harvard on transgenic mice, see that of Ursula Storb's lab at the University of Chicago and, closer to the production end of agriculture, the work of Carl Pinkert at University of Missouri. Pinkert, "Gene Transfer and the Production of Transgenic Livestock," *Proceedings of the U.S. Animal Health Association* (in press).
  17. I want to reemphasize the promise of biotechnology. If, as is predicted, transgenic animals can be developed that possess "mammary specific genes coding for proteins that enhance the nutritive value of milk or that are biologically important products in their own right," then the milk of healthy, flourishing cows kept in humane conditions could be the source of inexpensive, life-saving, proteins such as insulin or the blood component known as human factor IX. If the number of animals needed were reduced, and careful attention was given to their physical and psychological needs, purposes, and desires, rDNA research could lead to a revitalizing of our interdependent relations with animals. But, again, this possibility needs to be weighed against institutional and economic forces working against it.
  18. "[Kalter] estimates that the number of dairy farms may have to be reduced 25-30 percent to restore market equilibrium. These adjustments will almost certainly have dramatic social, economic, and cultural effects." Andrew Kimbrell and Jeremy Rifkin, "Biotechnology—A Proposal for Regulatory Reform," *Notre Dame Journal of Law Ethics and Public Policy* 3 (Fall 1987): 125. At a conference on "Public Perceptions of Biotechnology" sponsored by the Agricultural Research Service of the U.S.D.A. at Airlie House in Virginia in 1986, Dr. Kalter objected strongly to a speech by Rifkin in which Rifkin used Kalter's study in the way recounted here.
  19. Kalter (1985) Table 50, "Changes in Price, Output, Employment and Cow Numbers From bGH and a Free Market Policy by Elasticity of Demand," p. 101.
  20. I arrived at these figures by subtracting 20.4 (reduction in farm numbers with 0 technical change and a low elasticity of demand for milk) from 46.0 (reduction with 30 percent technical change) to get 25.6. I then subtracted 17.2 (reduction in farm numbers with 0 technical change and high elasticity of demand) from 33.1 (reduction with 30 percent technical change) to get 15.9. These, of course, are very rough calculations. Again, they refer to the percentage decrease in farm numbers due to technical change of many types, not simply bGH. If farmers started to milk four times a day instead of three, for example, that would lead to a greater output of milk and a corresponding need for adjustment. These qualifications need to be figured into the estimates.
  21. Quoted in Tangle, 592.
  22. Ibid.
  23. Buttel and Geisler (1987): 7.
  24. Ibid.
  25. Ibid.
  26. Ibid.
  27. Ibid., 8.
  28. Ibid.
  29. Ibid., 10.
  30. For an argument to this effect, see David Kline, "No-Till Farming and its Threat to the Amish Community," *Festival Quarterly* (Fall 1986): 7-10.
  31. See Schneiderman: 5, 7. For another discussion of the issue, see *Agricultural Biotechnology: Strategies for National Competitiveness* (National Academy Press, 1987).
  32. Quoted in Shulman: 20.
  33. Barnes and Nowak, abstract.
  34. P. Nowak, J. Kloppenburg, Jr., and R. Barnes, "bGH: A Survey of Wisconsin Dairy Producers," in *As You Sow* 18 (July 1987), Department of Rural Sociology, University of Wisconsin: 2.
  35. Buttel, "Farm Structural Change," p. 98, n. 5. Buttel adds the following caveat: "To be sure, most biotechnologies, including bGH, will be divisible inputs—that is, they can

- be used in either large or small amounts with relatively little difference in the purchase price. And divisible inputs such as biotechnologies will be less biased toward large farmers than "lumpy" technologies such as large tractors. But divisibility and scale-neutrality are not the same thing . . ." Luther Tweeten also believes that labor-saving technologies generally favor larger operations which can provide the lowest cost of production per unit. See Tweeten, "Has the Family Farm Been Treated Unjustly?" in Gary Comstock, ed., *Is There a Moral Obligation to Save the Family Farm?* (Ames: Iowa State University Press, 1987): 225. But note that Tweeten also believes that "out-put increasing technologies tend to be somewhat scale neutral," and that "government price and income payment policy has generally been neutral in its effect on farms of varying sizes producing program commodities" (219). For supporting evidence, Tweeten cites R. Spitze, D. Ray, A. Walter, and J. West, "Public Agricultural Food Policies and Small Farms Project." Washington: National Rural Center, 1980.
36. Jim Hightower, *Hard Tomatoes, Hard Times* (Cambridge: Schenkman, 1973).
  37. Office of Technology Assessment, *Technology, Public Policy and the Changing Structure of American Agriculture: A Special Report for the 1985 Farm Bill* (Washington, D.C.: U. S. Congress, OTA-F-272, 1985).
  38. David Braybrooke, "Justice and Injustice in Business," in Tom Regan, ed., *Just Business: New Introductory Essays in Business Ethics* (New York: Random House, 1984): 173.
  39. "In 1985 . . . the average governmental payment to farms was \$5,193 for farms with sales between \$40,000 and \$99,000 . . . and \$37,499 for farms with sales over \$500,000. The same groups of farms received \$1,169 and \$3,849 respectively, in 1980, which corresponds to a fivefold increment . . . and a tenfold increment . . ." Alessandro Bonanno, "Agricultural Policies and the Capitalist State," *Agriculture and Human Values* 4 (Sp-Sum 1987): 44.
  40. Braybrooke: 175.
  41. A study by Quail et al. found that if there had been packer competition instead of shared monopoly (four firms) in such regions as Colorado, Nebraska, and Iowa, that the "average price would have been roughly 24 cents per cwt higher and annual returns to feeders in these . . . regions would have been nearly \$42 million greater . . ." G. Quail, B. Marion, F. Geithman, and J. Marquardt, "The Impact of Packer Buyer Concentration on Live Cattle Prices." N. C. Project 117, Working Paper Series, WP-89 (May 1986): 55.
  42. In 1972, the Federal Trade Commission attempted to prove this, claiming that the ready-to-eat cereal industry was "highly concentrated (four firm market share of 91) and had high entry barriers". The Commission was unsuccessful, because "the judge concluded that the defendants had acted like independently behaving rational oligopolists, which is not sufficient to constitute monopolization." As Bruce Marion points out, this case shows that the courts are not prepared to deal with the complex issue of shared monopolies, choosing instead to apply anti-trust laws (if at all) only to markets clearly dominated by a single company. See Bruce Marion, *The Organization and Performance of the U.S. Food System* (Lexington: D. C. Heath and Co., 1986): 396-397.
  43. Cf. Luther Tweeten's view that "Federal income tax provisions have, relatively, most favored part-time small farmers and "syndicates" financing, for example, large cattle-feeding operations because farm losses can shelter off-farm income and provide large savings per dollar of farm output." He adds that in order to serve social justice we ought "(1) to phase out the investment tax credit and rapid depreciation allowance and (2) to target public program transfers more heavily on farm families with low incomes." Tweeten, (1987): 228, 231. The 1986 tax reform bill, it should be pointed out, promises to accomplish Tweeten's first goal. In general, Tweeten believes that "public programs have not favored large farms over family farms or had a major negative impact on social justice" (231).
  44. The California Rural Legal Assistance group sued the University of California in 1979, claiming that the Hatch Act of 1887 obligates Experiment Stations to benefit rural constituents, including small farmers, farm workers, and consumers. They charged that the University had a pattern of research that harmed rather than benefited those groups. "In March 1986, Superior Court Judge Raymond Marsh formally ruled that the Hatch Act obligates the Experiment Station to consider all of the beneficiary interests in evaluating and selecting its Hatch-funded research programs, and that primary consideration must be given to the small family farmer." In January 1987, the University formally admitted "as a matter of fact that . . . it has no process designed to ensure consideration of each legislatively expressed interest." From a letter written by Bill Hoerger, staff attorney, California Rural Legal Assistance office, 15 June 1987.
  45. See note 43 above.
  46. For an analysis of arguments from emotion, see Comstock, "Conclusion: Moral Arguments for Family Farms," in Comstock (1987): 402-405.
  47. The data in this paragraph and the one preceding is from "The Continuing Crisis in Rural America: Fact vs. Fiction," *Prairiefire Rural Action*, Des Moines, IA, May 15, 1987.
  48. Cf. Neil Harl, "The Financial Crisis in the United States," in Comstock (1987): 112-128.
  49. Lester Thurow, "Toward A Definition of Economic Justice," *Public Interest* 31 (1973): 77, quoted in Albert Borgmann, *Technology and the Character of Contemporary Life* (Chicago: University of Chicago Press, 1985): 111.
  50. Estimated in 1986.
  51. Braybrooke, 195.
  52. *Ibid.*, 179.
  53. Michael Novak, "Cash Income and the Family Farm: Reflections on Catholic Theology and the Democratic Capitalist Political Economy of Agriculture," manuscript, pp. 25-27, forthcoming in Gary Comstock, ed., *Is There a Conspiracy Against Family Farms?* (Tampa: USF Monographs in Religion and Public Policy).
  54. For accounts of mergers between seed and chemical companies, see Jack Doyle, *Altered Harvest: Agriculture, Genetics, and the Fate of the World's Food Supply* (NY: Viking, 1985): 104-106, and M. Kenney, J. Kloppenburg, Jr., F. Buttel, and J. T. Cowan, "Genetic Engineering and Agriculture: Socioeconomic Aspects of Biotechnology R & D in Developed and Developing Countries," in *Biotech 88: Proceedings of the World Conference on the Commercial Applications and Implications of Biotechnology* (Middlesex, U.K.: Online Conference Ltd., 1983): 475-489.
  55. Cf. these remarks from an otherwise very sensible economist about the farm crisis: "Americans [who can] plan for decline . . . do not attempt to fight the inevitable tides of economic change. . . . Agriculture has been marked by decline and in the future it will be characterized by decline . . . [But, unfortunately,] reality never stopped anyone from going to Mexico for laetrile." Thurow, "The Agricultural Institutions and Arrangements Under Fire," paper presented to the Social Science Agricultural Agenda Project, Phase 1 Workshop, Minneapolis, MN, June 9-11, 1987: 125-126. This sort of rhetoric, found in many agricultural economists who speak confidently about "facing the facts," the "inevitable tides of economic change," and "hard realities," would make for an interesting study in ideological discourse.
  56. John Rawls, *A Theory of Justice* (Cambridge: Harvard University Press, 1971).
  57. Thurow (1987): 118.
  58. *Ibid.* 124.
  59. Doyle: 7.
  60. As Thurow reminds us, if we love "to be or see farmers, it may be rational to protect [our] farmers with tariffs and



quotas. What is lost in terms of extra consumption utility is more than gained in extra producer's utility," Thurow, *Dangerous Currents* (New York: Random House, 1983): 121. Quoted in James Montmarquet, "Agrarianism, Wealth, and Economics," *Agriculture and Human Values* 4 (Sp-Sum 1987): 49. I wonder whether Thurow forgot this point between 1983, when he wrote it, and 1987, when he implied that trying to retain labor in agriculture would demonstrate the same naivete as going to Mexico for a miracle cure.

61. Marcus G. Raskin, *The Common Good: Its Politics, Policies, and Philosophy* (New York: Routledge & Kegan Paul, 1986): 147.
62. Bruce Douglass, "The Common Good and the Public Interest," *Political Theory* 8 (February 1980): 105.
63. On the notion of a practice as a human activity whose goods are internal rather than external to it, see Alasdair MacIntyre, *After Virtue: A Study in Moral Theory* (Notre Dame: University of Notre Dame Press, 1981). On the idea of humans as "members and citizens" of a shared kingdom rather than as "conquerors" of it, see Aldo Leopold, *A Sand County Almanac* (New York: Oxford University Press, 1949): 204.
64. Environmentalists will recognize this language as that of Leopold, who said that the basic principle of the land ethic

is: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." Leopold: 224-225.64.

65. Galbraith, quoted by George Anthon in the *Des Moines Register*, October 11, 1987.
66. Ibid.
67. An earlier version of this paper, entitled "Just Cows? Agricultural Biotechnology, Bovine Somatotropin, and the Common Good," was presented to the "Agricultural Bioethics Symposium" at Iowa State University in November 1987, and to the Fourth International Conference on Social Philosophy, Oxford University, in August, 1988. A revised version was presented at Oregon State University in the National Rural Studies Committee seminar series, October, 1988, and at the American Academy of Religion, annual meeting, November, 1988. The research was supported by the State of Iowa, the Joyce Foundation, the Northwest Area Foundation, Iowa State University's Committee on Agricultural Bioethics, and Oregon State University's Western Rural Development Center. It is a pleasure to acknowledge these sources of financial support.

I would also like to thank Robin Attfield, David Kline, and Jeffrey Burkhardt for incisive criticisms of the argument; would that I could answer all of them.