

## nature biotechnology

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### Science-based policy

To the editor:

In his letter about what constitutes appropriate demeanor and decorum for discussions of public policy, Edward Groth III, director of technical policy and public service at Consumers Union (CU), concludes that "if we want good science to be the foundation for policy, we have to speak scientifically." True enough, but that ethic is often transgressed in discussions of policy by his own organization: CU frequently warns, or rather frightens, consumers about a host of remote and unsubstantiated health "risks," from plastics and pesticides to products of biotechnology.

During the past decade, Michael Hansen and others at CU have conducted a relentless, baseless public vendetta against biotechnology. They have attacked bovine somatotropin (BST), a protein that increases the productivity of dairy cows and enables farmers to maintain milk yields but with fewer cows and less feed. It is the largest selling dairy animal health product in the United States, and its use is growing about 30% annually. BST is perhaps the most thoroughly evaluated veterinary drug in history, and a very safe one, but CU continues to raise implausible health risks.

In October, CU's Mark Silbergeld, testifying before the research subcommittee of the US House Science Committee, demanded more stringent regulation of agricultural biotechnology after denouncing the "inadequacies of the regulatory system that should but does not yet assure us these products are as safe as they should be for consumers to eat and as safe for the environment as they should be to prevent serious environmental consequences." While expressing his concerns—which conflict with the broad scientific consensus that gene-spliced foods are more precisely crafted and are at least as safe as other foods—Silbergeld acknowledged that neither his organization nor any other has found evidence that foods produced with gene-splicing techniques are unsafe in any way. Moreover, he simply ignored that gene-spliced crops were planted in 1999 on more than 70 million acres in the United States alone with no reported mishaps; and that thousands of foods with gene-spliced ingredients have for several years been commonly found in American and European supermarkets, with not a single reported problem.

Consumers Union seems often to be technophobic. Recently, the organization used a dubious non-peer-reviewed "toxicity index" to raise concern among parents about minuscule levels of pesticide residues that are both legal and safe. Like CU's position on BST and biotech foods, this kind of junk science more often needlessly frightens consumers than helps them to make intelligent and informed decisions.

Even when CU's representations are narrowly accurate, they suffer from facts "too carefully selected," and regularly fail to offer a broad, balanced perspective on the relative risks of various foods, other consumer products and activities.

Mr. Groth should clean house before he pontificates about the intellectual clutter elsewhere.

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### Cloning nonuniformity

To the editor:

I would like to suggest another dimension to the ongoing discussion concerning developmental defects and high rates of mortality among animals produced by cloning (*Nat. Biotechnol.* 17, 405 & 733, 1999). This concerns the nature of X inactivation in cloned female animals. One would assume that a nucleus recovered from a cell in the G<sub>0</sub> phase would have one X-inactivated chromosome (X\*), and that, during the subsequent manipulations that occur during nuclear transplantation and early embryo development, one of the following would occur: (1) Both Xs are reactivated and then random X inactivation occurs as per normal; (2) both Xs are reactivated, but at a "slower" rate than normal and the subsequent inactivation may be delayed with the result that larger than normal chimeric clones of each X\* develop; (3) the reactivation of X\* may not occur at all, and the cloned animal may be "imprinted" for one or the other of the Xs as per the original cell from which the nucleus was transplanted—resulting in the same "imprinted" X-chromosome phenomenon as in marsupials; (4) faulty inactivation and reactivation occurs, possibly with some cells in the cloned animal expressing both X alleles.

Each of these scenarios raises some interesting possibilities concerning both the "clonality" and the health of the cloned animal. Thus, even for scenario (1), the animal would obviously not be a clone of the donor, especially if the animal from which it was derived was not inbred. Obviously, this would also be the case for scenario (3). For scenario (4), it is possible that the cloned animal could have some XX-dosage problems

that, depending on the extent and tissue locality of the phenomenon, could have serious health consequences (cf. the well-documented problems in human genetics).

Awareness of these potential problems may well enable breeding and manipulation strategies to be developed that avoid the more serious complications that have been reported in some cloning experiments. One would assume that these problems would not occur in male clones.

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### Quantitative RT-PCR

To the editor:

In his commentary, W.P. Halford (*Nat. Biotechnol.* 17, 835, 1999) proposes that most quantitative PCR applications require neither the use of internal standards (competitive PCR), nor a quantification of the DNA products during the log-phase (TaqMan). His method relies on the occurrence of the primer-dimer artifacts in PCR reactions that compete with template DNA. The ratio of input DNA/primer-dimers will determine the amount of template DNA amplified at the plateau phase, thus providing DNA quantification if primer-dimers were constant.

Halford's commentary could be misleading to the nonspecialists, who should consider two important drawbacks of the proposed method. First, the amount of primer-dimers is variable and depends on numerous factors such as time and temperature before starting PCR cycling, Mg<sup>2+</sup> concentration, the presence of reverse transcriptase, which make sample-to-sample comparison misleading. Second, primer-dimers greatly reduce the yield of PCR. In order to limit the formation of primer-dimers, numerous protocols and enzyme formulations (hot starts) are available.

Contrary to Halford's statement on the limit of template detection (300–1,000), our personal experience and that of many others is that the theoretical limit (one molecule) is easily achieved when reliable hot-start protocols are used. Avoiding the formation of primer-dimer artifacts and the use of internal standards are still the prerequisites for PCR when a sensitive and accurate quantification is required.

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