

## Current ethical issues in animal biotechnology

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**Abstract.** The present paper reviews the current status of opinion and debate regarding ethical issues in three broad categories of relevance to animal biotechnology. The first is scientific integrity, where the focus has been on scientific fraud and the integrity of the research process. The second concerns possible harms or risks to parties affected either directly by research (including animals themselves) or through the eventual commercialisation or development of products from animal biotechnology. The final category concerns a responsibility to serve as a guardian of the public interest with respect to application and development of technologies derived from new genetic sciences. It is plausible to see the scientific community as a whole having such a fiduciary obligation to the broader public in virtue of the technical complexity of the issues and owing to the public funding and institutional support for scientific research. The overall conclusion is that in the latter two categories especially, there is an urgent need for new participation in deliberative consideration of ethical issues by working scientists.

### Introduction

There is now a surprisingly large published literature on ethical issues associated with cellular reproductive technologies and the manipulation of animal genetics using recombinant DNA. This literature includes ethical and legal studies intended to stipulate or critique the normative basis for the regulation and guidance of animal biotechnology in both research and production settings, as well as studies of public understanding of (and attitudes towards) the use of these technologies. It also includes policy oriented studies that are intended to inform regulatory procedures at both the governmental and institutional level. There is, however, an even broader context for considering ethics and animal biotechnology. Only a few transgenic or cloned vertebrate animals have been developed for commercial production and only for relatively small-volume markets, such as biomedical research animals and pets. Yet, transgenic plants for commodity crops have seen widespread global adoption, with attendant controversy and protest from an array of opponents. Practices that offend disparate and seemingly distinct audiences create a set of concerns that overlap one another in the claims that they make about alleged ethical problems with biotechnology. These range from environmental and food safety questions about so-called 'GMOs' (the popular term for agricultural food and fibre crops transformed through genetic engineering) through opposition to industrial agriculture and protests against the way that regulation of biotechnology has been handled at the international level to rather inchoate feelings of impropriety about cloning and the manipulation of mammalian (including human) DNA. The result is that divergent interests appear to coalesce into what many would characterise as a social movement in opposition to agricultural and food biotechnology, a social movement created more by the convergence of these multiple concerns than by the prevalence of any single cause for ethically based opposition. There is no question that animal biotechnology has been swept into this controversy (Thompson 2007).

As a result, the current situation with respect to public and scholarly debate over animal biotechnology is multifaceted and complex. In short, the complexity and breadth of ethical issues associated with animal biotechnology cannot be comprehended within the framework of a single article. The present paper will reduce the range of complexity in these concerns to a manageable level by focusing on ethical issues of direct relevance to scientists conducting research that develops or applies tools of biotechnology to vertebrate animals. What follows should be viewed as a survey of topics within this narrowed scope, rather than an exhaustive or analytical discussion. Thompson (2007) provides a more extensive analysis of most topics surveyed below.

Succinctly stated, bench scientists' ethical responsibilities involve duties to preserve the integrity of the scientific process, to avoid harm to others as a result of their work and to fulfill such fiduciary commitments as are acquired through the organisation and funding of scientific research. 'Fiduciary' literally means 'of, based on, or in the nature of trust and confidence, as in public affairs' (Dictionary.com 2007), although in this context a second sense usually associated with money and relating to public confidence in the value and reliability of currency is also relevant.

Each of these three categories are broken out below for more detailed discussion, although emphasis will be given to the second and third. As citizens, family members and simply human beings, scientists acquire a more extensive set of ethical responsibilities, to be sure. Yet as scientists, bench scientists cannot be held responsible for the injustices of globalisation, the inequality associated with capitalism or the environmental insults associated with pollution or climate change, despite the role that advanced technology has played in the emergence of these phenomena. Some of the most hotly contested social issues raised in connection with biotechnology are thoroughly embodied in these large-scale controversies. One consequence of

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