CHAPTER 10

# Wasted Money in United States Biomedical and Agricultural Animal Research

*Jim Keen*
University of Nebraska-Lincoln, Lincoln, Nebraska, United States
*jekeen918@gmail.com*

## 1 Background

> To kill an error is as good a service as, and sometimes even better than, the establishing of a new truth or fact.
>
> CHARLES DARWIN, 1879

Biomedical and agricultural animal research uses millions of experimental animals and dozens of animal species each year by choice, precedent, or regulatory mandate in basic and applied life science research and toxicity testing of drugs, chemicals, and consumer products. Animal research is a large component of the international US$270 billion government-subsidized, biomedical industrial ecosystem (Chakma et al., 2014). In the United States (US) and presumably elsewhere, about half of these funds support animal research and testing (Institute of Medicine and National Research Council, 2012). Each year at least 115 million experimental animals (mostly mice and likely a significant underestimate) are used worldwide (Akhtar, 2015). The *status quo* animal research environment provides "ecosystem services" to a large number of inter-dependent "species", including governments, academia, biotechnology, agri-food and pharmaceutical industries, and publishers. Losers in this system are the conscripted animals (for "labor") and taxpayers (for "capital").

Animal research squanders precious public and private monies directly, indirectly, by opportunity cost, and by unintended negative consequences. There is no doubt that biomedical and agricultural animal research have delivered societal dividends. Nevertheless, the questionable benefit-cost ratio and the unquestionable negative repercussions of animal research are enormous for taxpayers, patients, and the public at large. Precise animal research investments and attendant waste are impossible to ascertain, in part because the research community and the US government obfuscate financial and animal use data. However, estimated US tax dollars wasted on animal use in biomedical and

 | DOI:10.1163/9789004391192_011

agricultural research range, conservatively, from US$5 billion to US$9 billion per year. Even though exact monetary and animal use data are unobtainable, in this chapter I use the best available, if imprecise, estimates. The estimates themselves are arguable, yet the underlying conclusions remain valid.

## 2 Biomedical Animal Research

Animal experiments are of two types: basic (e.g., investigation of biological phenomena and animal models) and applied (e.g., drug research and development (R&D), and toxicity and safety testing). Applied research can also be preclinical (e.g., molecular biology, cell culture, animal models) or clinical (e.g., human drug or vaccine efficacy trials). The preclinical research goal in animal experimentation is to generate candidate drugs, bio-medical technology or devices and diagnostic tests to evaluate downstream for clinical testing and possibly commercialization, a laboratory-to-patient process called *translation*. Preclinical research also entails toxicity testing of drugs, vaccines, chemicals, cosmetics, and other consumer products, usually in mice and dogs. Veterinary biomedical animal research is structured essentially the same as its human counterpart albeit on a much smaller scale. The desired outcome of preclinical research, mostly performed by government and academia, are scientific papers, the currency (along with grant funds) of research success. The desired outcome of applied research, mostly performed by biotechnology and pharmaceutical firms, are patented biomedical products that reflect successful translation and new revenue streams. Public acceptance of animal research, especially if invasive and painful, is contingent on substantial human benefits and fiscal accountability. Unfortunately, taxpayers often support animal research under the false hype of "breakthrough" animal model-based medical progress.

Most preclinical research is publicly funded. The US National Institutes of Health (NIH), the world's largest biomedical research organization with a 2019 budget of US$39.2 billion, emphasizes infectious diseases and oncology (NIH, 2019). The biotechnology and pharmaceutical sectors favor product development and commercialization (e.g., bio-engineered drugs, vaccines and clinical trials for cancer, analgesics, anti-diabetic drugs, and some rare diseases). The public sector generally relies more on animals than the private sector. However, the private sector depends indirectly on publicly funded animal research as a pipeline for candidate drugs or technologies to convert into marketable biomedical products (Dorsey et al., 2009; Moses et al., 2015).

Tax-supported animal research and testing is conducted or sponsored by several US agencies, especially the NIH. Federal laws mandate animal testing