Introduction

The number of new devices developed in medicine and veterinary science continues to increase every year. According to the Derwent World Patents Index® (DWPI SM), there was an increase of 12% in the number of device patents in the medical field between 2010 and 2011. The use of animals during the development and validation phase of new devices is still the established practice.

The use of animals for experimental purposes has raised ethical concerns since the beginning of the 18th century. In fact, Charles Darwin was one of the first scientists to condemn this practice (1). Since then, many countries have introduced specific laws and regulations on the use of animals for experimental purposes. A cornerstone was set by Russell and Burch in 1959, when they published The Principles of Humane Experimental Technique (2), which established the basis of the well-known Three Rs principles of Refinement, Reduction and Replacement. The idea behind this concept was to give scientists a specific framework when designing and conducting experiments, in order to enhance the well-being of the animals involved (refinement), to improve the quality of the data while using fewer animals (reduction), and to consider alternatives to animals for conducting the experiments (replacement). The European Community embraced these principles for the first time in Directive 86/609/EEC (3), and they were recently integrated and addressed in more detail in Directive 2010/63/EU (4). Now, the Three Rs principles constitute a prerequisite for good standards of practice in animal experimentation within the European Union.

Despite this new culture concerning the use of animals, the Sixth Report on the Statistics on the Number of Animals used for Experimental and other Scientific Purposes in the Member States of the European Union (3) showed that the total number of animals used for research and training purposes has only fallen from 12.1 million in 2005 to 12 million in 2008. Even if we take into account the different number of countries included (25 Member States in 2005 versus 27 Member States in 2008), the overall effect is somewhat disappointing. As we show in Table 1, the decrease in the use of some species has been compensated by a sharp increase in the use of mammals, especially large ones. This trend has been confirmed by the analysis of the use of animals for education and training, and for the research and development of products and devices for medicine, dentistry and veterinary science (excluding toxicology and other safety evaluation; Tables 2 and 3).

One way of reducing the numbers of animals used for training and for the development of surgical tools (which nowadays also includes robotic surgery systems) is to use animal organs received from abattoirs. Recently, Laird et al. (5) used the abdominal organs of calves, placed inside a standard laparoscopic abdominal trainer, to practice and demonstrate laparoscopic nephrectomy. Waseda