4 Applying Ethical Thinking and Social Relevance

With Franck L.B. Meijboom (Section 4.3)

In the preceding chapters, normative ethical theories, key concepts of research ethics and animal ethics have been presented, including the legislative basis for ethical evaluation (harm–benefit), the 3Rs and relevance of research in terms of translation. In the present chapter, these concepts and theories are applied using concrete examples of animal research. In Section 4.1, a number of recent examples from different research fields are presented, based on which some examples of what ethical issues arise and how an ethical scrutiny can be performed are presented in Section 4.2. Societal aspects and how to take them into account are discussed in Section 4.3.

4.1 Research on Animals: Examples of Different Purposes and Impacts

Different research projects result in very different impact on animals, ranging from below the threshold for legislation in many countries (e.g. observational research of animals living in their natural environment) to severe (e.g. inducing severe diseases). As an illustration of different kinds of projects and how to consider the different aspects of their impact on research animals, we here present a list of projects of different severity. In order to ensure that the examples are realistic and up to date, they have been selected from research papers published in 2014–2015.[1] Wildlife, biomedical and agricultural applications are covered in studies carried out in several European countries as well as the United States, Japan and Brazil. An overview of the studies is presented in Table 4.1.

[1] A Pubmed search for the term ‘disease’ with the filter ‘other animals’ was carried out on 27 April 2015. Abstracts and papers were checked until a sufficient number of examples for each severity category had been found.

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Table 4.1 *List of projects on wildlife, biomedical and agricultural applications performed in different countries exemplifying different degrees of severity and different aims in the light of societal relevance.*

Example	What is the social relevance of the study?[a]	What is done to the animals?	What will the animals experience?	Severity
1) Genetic diagnosis in bovine embryos (Kageyama *et al.*, 2015)	If successful, this method will permit breeding for healthy animals without decreasing the gene pool. This is relevant for animal production and gene diversity in a small breed.	Administration of FSH (follicle-stimulating hormone) to cows. Artificial insemination. Flushing through insertion of a catheter into the uterine horn to obtain embryos.	FSH administration leads to superovulation which may be painful Flushing done under regional anaesthesia (epidural). 6–7 day embryos are not covered by legislation and thus severity classification does not apply.	Mild

(*continued*)

Table 4.1 *(continued)*

Example	What is the social relevance of the study?[a]	What is done to the animals?	What will the animals experience?	Severity
2) Oral vaccination of wild white-footed mice to prevent Lyme disease transmission (Richer *et al.*, 2014)	This example addresses a disease that is widely recognized as a serious threat to human health and tests a potential strategy for the prevention of Lyme disease transmission.	Live-trap capture of wild white-footed mice Trapped mice are ear tagged, weighed and inspected. Selected mice are brought to the laboratory for blood sampling (100µl).	Stress while kept in the live trap. Maximum time in trap is around 15h. Additional stress from handling. Both restraint and handling stress is increased for mice which are selected for blood sampling. Repeated exposure to stressful procedures (a mouse recaptured on average 6.5 times).	*Moderate*
3) Effect of food emulsifiers on mouse gut microbiota and health (Chassaing *et al.*, 2015)	The aim is to understand the role of widely used food additives in the increase of widespread human health problems.	Exposure to emulsifiers (food additives) through drinking water. Fasting for up to 15 h Gavage	Emulsifier administration leads to colitis in some mice. Stress in particular from gavage which is a particularly aversive administration technique. Accumulated experience per animal not clear from the paper.	*Moderate* for mice which develop colitis, possibly *mild* for the remaining mice unless repeated gavage
4) Peridontal disease rats (Scarabelot *et al.*, 2014)	The aim is to get scientific knowledge and to understand how exposure to high levels of corticosteroids affects disease development. This could later lead to better treatments.	Ligature placement around second maxillary molar (under general anaesthesia) Corticosteroid inhalation in ventilation chamber.	Ligatures remain in place for 15 days, during which gingival inflammation develops.	Moderate
5) Vaccination in broilers (Dortmans *et al.*, 2014)	Testing the efficacy of vaccinating broiler chickens against Newcastle disease improves animal health and food safety.	Intranasal / intratracheal administration of virulent Newcastle disease virus strains to broiler chickens.	Animals with suboptimal immunity will be infected and develop Newcastle disease. Clinical signs include breathing difficulty, neurological signs, diarrhoea and general sickness. 50–100% of birds (depending on virus strain and bird immune status) died within 14 days after infection.	Severe

(continued)

Table 4.1 *(continued)*

Example	What is the social relevance of the study?[a]	What is done to the animals?	What will the animals experience?	Severity
6) Graft-versus-host disease in mice (Theiss-Suennemann *et al.*, 2015)	The project's direct aim is to test the effect of glucocorticoids on acute graft-versus-host disease. The results could lead to better treatments.	Total body irradiation Intravenous injection with transplanted bone marrow and T-cells or spleen cells.	Transplantation leads to graft-to-host disease (transplanted immune cells attack host tissue with damage of the liver, skin, mucosa and gastrointestinal tract. All animals reached severe graft-to-host disease (at which point they were euthanized) within 45 days after transplantation.	Severe

[a] Social relevance refers not only to human health and welfare but also to effects on animals and nature, as well as overall economic and societal situation. The aspects mentioned in the table are by necessity fewer than those elaborated on in the text.

Source: Original table by Meijboom, Röcklinsberg, Gjerris and Olsson.

In the first example, a genetic analysis is carried out on cattle embryos. The objective is to develop a method to diagnose genetic diseases, to be used in a cattle breed with small genetic diversity and significant problems with hereditary pathologies. The animals involved in the harm analysis here are the donor cows, since 6–7 days post-conception is too early in the developmental stage for the embryos to be considered potentially sentient or to be covered by legislation. The embryo production and collection involves hormonal stimulation to make the cows superovulate (in order to be able to harvest a large number of embryos for each cow), followed by artificial insemination and flushing of the uterus. Stimulation with follicle-stimulating hormone is done through daily injections for 3 days, and the main impact is probably not the injections, but the effects of superovulation, which is potentially painful (van Reenen, 2009). Artificial insemination and embryo harvest both involves inserting a catheter through the cervix, which the technician is locating through inserting their other hand in the rectum of the cow. Artificial insemination takes a couple of minutes and is done without anaesthesia. To harvest the embryos, a catheter is inserted through the vagina into the uterus, and saline solution is slowly flushed through the uterus. The size of a cow allows the procedure to be done non-surgically and with the cow awake and standing, using epidural anaesthesia to anaesthetize the genital region. The process is similar to that used in cattle breeding and does not cause persistent harm to the cow beyond the relatively short-lasting discomfort associated with superovulation and with the flushing procedure. Therefore, the appropriate classification for this experiment seems to be *mild*.

In the second example, wild-living white-footed mice are studied to evaluate how effective an oral vaccine is in preventing Lyme disease infection. The objective is to explore ways to reduce human exposure by vaccinating the wild reservoir host. White-footed mice are caught using baited live traps. The bait is also the vehicle for the oral vaccine. Traps are set up late in the afternoon and checked approximately 15 hours later. Mice which are caught are equipped

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with an individual ear tag, weighed and inspected and released again. In addition, randomly selected mice are brought to the laboratory for a blood sample to be taken. Impact on the animals in this experiment is above all stress from capture and handling of these wild animals with no experience of human contact. In the case of mice which are captured, ear tagged and inspected, this stress is classified as mild, since human contact is very brief and the period which the animals are kept in the trap is minimized to that necessary to ensure that enough mice are indeed trapped, i.e. covering the dark period of the day when these nocturnal animals are active. Blood sampling subjects the mice to a longer period in captivity (not specified in the paper), more extensive manipulation and transport. On average, each mouse was captured 6.5 times and blood-sampled once. Even though there is minimal physical intervention with the animals, the stress reaction likely to be evoked in wild mice trapped for up to 15 hours justifies a classification as *moderate* rather than *mild.*

In the third example, laboratory mice are used to study how food emulsifiers affect gut microbiota and metabolic health. The objective is to understand the potential role of dietary emulsifier in inflammatory bowel disease and metabolic syndrome. Mice are administered different food emulsifiers through their drinking water for three months, and thereafter different parameters are measured. At the end of treatment, blood is collected through the retroorbital approach, immediately followed by euthanasia and organ collection. Other parameter measurements imply different combinations of fasting (4–15 hours) and substance administration through gavage. It is not clear how the procedures are combined in individual mice. Some mice develop colitis as an effect of the emulsifier treatment. The retroorbital blood sampling method is controversial, but the main problem (post-sampling complications if not correctly executed) does not apply in this experiment, as the mice are euthanized immediately after blood sampling. However, it may be possible to change the order so that blood is drawn immediately after euthanasia. The impact of fasting depends

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on the duration, and the longest fasting here is overnight (15 hours), which is within the mild range according to Directive 2010/63/EU. Gavage may be aversive but, if done by a skilled technician, mice are likely to habituate to the procedure, which is short lasting. Colitis (inflammation of the colon) is an unintended side effect affecting some of the mice. Considering that individual mice may experience several of the procedures as well as the pathology, the study should be classified as *moderate* even though for some mice it may be *mild*.

In the fourth example, periodontal disease is induced in laboratory rat in order to understand how exposure to high levels of corticosteroids affects disease development. To induce periodontal inflammation, cotton ligatures are placed around one of the molars (procedure is performed under general anaesthesia). Corticosteroids are administered in a forced ventilation chamber where the animals inhale the nebulized drug once per day. After 15 days, the animals are euthanized and all measures are taken post-mortem. The study implies induction of a disease which is painful. Although the pain is localized to a small area, the mouth and teeth are particularly sensitive areas, and it therefore seems most appropriate to classify the study as *moderate*.

In the fifth example, the efficacy of vaccinating broiler chickens against Newcastle disease is studied (Figure 4.1). Chickens are obtained from farms, where they had either been vaccinated under field conditions (oral vaccine in drinking water) or not vaccinated. In addition, a group of non-vaccinated SPF (specific pathogen free) chickens from the same farm is included. All animals are intranasally/intratracheally exposed to Newcastle disease virus of different strains. Unless the vaccine confers effective protection, this virus challenge will cause birds to develop Newcastle disease, which in unprotected birds progressively lead to death. After the challenge, the animals are observed daily for 14 days or until found dead, whatever happens first. Survival varies between groups, but at least 50% of birds die from Newcastle disease, with 100% mortality in the non-vaccinated SPF group. Since the study implies full disease development leading up to death for a proportion of the animals, the appropriate classification is *severe*.

In the sixth example, the effect of glucocorticoids on acute graft-versus-host disease is tested in laboratory mice. To knock out the immune system, mice are exposed to total body radiation. Subsequently, bone marrow and T-cells or spleen cells from mice of a different genetic background are transplanted through intravenous injection. This transplantation leads to the development of acute graft-versus-host disease, in which the transplanted immune cells attack the host tissue which is perceived as foreign, since the host and the immune cell donor are genetically different. All animals developed severe graft-versus-host disease and reached the predefined humane endpoint (losing 20% body weight or moribund) state within 45 days after transplantation. Since the study implies full disease development leading up to death (euthanasia of moribund animals), the appropriate classification is *severe*.

4.2 RESEARCH ON ANIMALS IN THE LIGHT OF DIFFERENT ETHICAL THEORIES

In this section we will discuss the preceding examples as seen from the perspectives of the ethical theories presented in Chapter 2. This will show how a certain research protocol – or any ethically loaded situation, for that matter – is perceived differently depending on the ethical position from which it is evaluated.

From a *contractarian* point of view, the only considerations to take is how using the animals in these different ways will affect the evaluator. Will s/he in the long run be better able to obtain her goals by doing it? Or would s/he be better off by taking a stance against some or all of the experiments? How does the use of animals in research affect the social contracts that s/he has entered? The calculations of the economic or social effects of different positions might be complicated, but at no point in the equation are any of the animals regarded as anything but a mean to achieve the researcher's ends. Such an ethical position can be regarded as rather extreme, and

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since it does not consider animal welfare at all, it is not relevant for further consideration here. Please note that this is not a dismissal of the philosophical qualities of the position, but a pragmatic choice based on the fact that most legislation on animal research grant animals some protection. This is explicit in Recital 12 of the EU directive (2010/63/EU), which implicitly dismisses the position by stating that animals have an intrinsic value that must be respected and that concerns of the general public are relevant:

> Animals have an intrinsic value which must be respected. There are also the ethical concerns of the general public as regards the use of animals in procedures. Therefore, animals should always be treated as sentient creatures and their use in procedures should be restricted to areas which may ultimately benefit human or animal health, or the environment.

Someone holding an *animal rights* view could, contrary to values implicit in most legislation on research animals, argue that in example 1 (genetic analysis on cattle embryos) the cow that is impregnated with the calf can be seen as a victim of instrumentalization. Independently of the level of welfare impairment, she is wrongly used as a tool to produce embryos, rather than respected in herself. Further, the embryos are also harmed. Even though they are not caused suffering, they may still be wronged due to their reduction to an instrument for human purposes. A similar critique would apply in example 5 (Newcastle disease in chickens), where the entire purpose of the study would be questioned. Departing from the position that each animal is subject in its own life, large-scale poultry production is unacceptable from the outset. Inducing a disease which we know causes the birds to suffer in order to study a vaccine that will enable such production systems cannot be justified. On the other hand, since Newcastle disease spread also in free range or extensive housed chickens, this is a welfare issue independent of housing system. However, development of the vaccine is probably motivated by economic interests also associated with the high-intensity production systems, something not approved by an animal rights defender. An animal rights position on example 3 (wild mouse) is not necessarily as critical. Even though the capture and blood sampling is unpleasant for the mice, the vaccine will improve their health, and hence could be regarded as less of an instrumentalization. There are many discussions within the animal rights community as to what human obligations towards wild animals are: leaving them alone or interfering to improve their lives? That is, unlike when developing a vaccine which may improve the health of animals which the animal rightist thinks should not be kept anyway (chickens for meat or egg production), the health gain for wild mice might be accepted from the animal right's point of view.

On the other hand, if animal rights prevailed, there would be much fewer chickens around, which from a *utilitarian* position could be an issue if one takes the goal of maximization of utility (e.g. happiness or preferences) seriously. If, all things considered, chickens in this study have a good enough life to add preference satisfaction to the total 'account', then they should be bred. Given the classification of 'severe' in the description above, this is, however, most probably not the case and shows that animal welfare assessment would be a central part from a utilitarian position, contrary to an animal rights position. From the latter, however, if a study also includes genetic modification, the question of whether or not this is acceptable as such is evoked. A rights position may describe this as an additional harm to the individual animal by its obvious instrumentalization, besides the harm caused by the effects of the modification and the experiment.

In general, the utilitarian position finds that the amount of welfare lost and won through the actual experiment on the animals needs to be weighed against the possible costs and gains that will come out of it. Factors that should be taken into account are the economic costs and possible gains, the effect on all involved – from animal caretakers, to people benefitting from the results, to people experiencing a welfare loss because of their objection to animal experimentation. The pain and suffering of the mice in example 6 is thus justifiable as long as the potential benefits are realistic and large enough to outweigh them. In general there is nothing wrong with using sentient individuals for research as long as the welfare of all welfare-capable beings affected by the research is maximized. It will therefore depend on a case-by-case analysis that, as discussed in Chapter 2, often will rest on guesstimates of the positive and negative effects of the research. It is therefore necessary to gain as much information as possible and be very open about the assumptions underlying the evaluation of e.g. the importance of the welfare loss of the animals to make a valuable utilitarian analysis of a specific case.

Example 2 and parts of 3 (wild-living white-footed mice and food emulsifiers and euthanasia at 3 months) are rather uncomplicated from a *utilitarian* position. Although undoubtedly stressful for the wild mice to be caught or have blood sampled from behind the eye, the suffering is relatively limited, and given that the chance of a positive outcome of the study is high, the benefits will typically be evaluated to outweigh the harms. In example 3 the mice are euthanized and that should, from the utilitarian standpoint, ideally be compensated by bringing other beings into life, with comparable or better welfare, or by increasing the overall welfare in other ways in order to be acceptable. From both *virtue* and *feminist care ethical positions*, the wild mouse example is more interesting, though. What kind of researcher am I, to catch and stress innocent wild mice? On the other hand, it might be the only defendable way to get hold of research animals, as they are not bred and caged for their entire life, and are also released again. Could it be that the fact that I vaccinate them (i.e. boost their health) compensates for the welfare impairment through ear tagging and blood sampling? Is this to embody the virtue of kindness or the vice of putting other's interests aside to obtain my own goals? From a *care ethics* perspective, it is relevant to focus on the possibility to take care of non-domesticated mice. Compared to mice used to human handling, caging, indoor smells and sounds etc. – everything is frightening, and even the gentlest handling possible

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FIGURE 4.1 Brown hens.
Source: Image © Understanding Animal Research, www.understandinganimalresearch .org.uk.

comes foreign to them. Hence, what is relevant to ensure according to feminist ethics of care cannot be ensured, and therefore makes the study difficult to approve.

From both a *virtue ethics* position and according to *feminist ethics or ethics of care*, studies as in examples 4 (periodontal disease), 5 (Newcastle disease) and 6 (the effect of glucocorticoids on acute graft-versus-host disease) are difficult to approve. In these examples the induction of disease and drug administration/vaccine treatment causing pain and the killing in itself might be contrary to how a caring person is considering him/herself. Although consequences should be taken into consideration in discernment of a situation, neither virtue ethics nor feminist ethics regards a comparison of outcomes and harms to be a sufficient approach, hence potentially high benefits cannot in themselves be a carte blanche to proceed. These positions rather ask if the individual needs of the animals are met, how it is housed and fed etc. In none of these cases the needs and preferences of the animals are met, and in case 6 animals are even kept alive until a late endpoint, and individual needs are severely harmed. A person holding a virtue ethics position would also ask if this kind of handling of animals is compatible with the ideals of being a wise, just and attentive person. Attention to human needs is important, and open for use of animals, but also attention to animal needs is crucial.

It is also relevant to consider the need for the potential benefit, i.e. need of the resulting information also for both virtue and feminist care ethicists. This is perhaps easier to evaluate in example 5, possibly coming to the conclusion that a new vaccine against Newcastle Disease is not necessary, as the entire standard housing of chickens is contrary to what a virtue ethicist and feminist care ethicist would accept. Regarding example 4 and 6, the expected benefits are not as clearly expressed, and perhaps difficult to evaluate, but as the level of animal harm is high, i.e. total lack of individual care and attention, acceptability from a virtue or feminist ethics is not probable.

As shown here, the different ethical perspectives will evaluate the cases differently. This is worth keeping in mind when one enters ethical discussions on animal research in general or on specific cases. The reasons for disagreements are hence not necessarily based on lack of knowledge from some of the participants or their unwillingness to listen to common sense. Often it is based on different value perspectives. Also, outside academic philosophy, we rarely see pure utilitarianism, pure virtue ethics etc; what we see is that elements of the different theories often appear in any discussion of an ethically challenging situation. Against this background, discussing ethically laden issues against these positions might not lead to a shared agreement, but it could lead to a higher degree of understanding and respect for those that do not share the same opinions – and thus in the end lead to more socially robust compromises on how to proceed with animal research.

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4.3 SEARCHING FOR SOCIAL RELEVANCE: COMPLEX EVALUATION OF ANIMAL RESEARCH

In the previous section different types of research were discussed, demonstrating a variety in classification of harm. This harm assessment, however, is only one part of the ethical evaluation of animal-based research. It is also a matter of benefits. Researchers aim to achieve certain goals by doing animal research. In some cases the research goal lies exclusively on scientific progress, but quite often a social relevance is claimed, and hence this social significance has to be included in the ethical assessment of a research project. However, legal documents and professional guidelines often lack clear and practical guidance with regard to the assessment of the relevance and benefit of an experiment (Grimm, 2014; Vieira de Castro and Olsson, 2015). This is not the result of indifference, but an indication that the evaluation of the (social) relevance of animal research is not an easy task. This section aims to get a grip on the social relevance of animal research. What is the social significance of a specific research project and can it be distinguished from scientific aims? Why is the evaluation of social relevance difficult in real life, and is it possible to deal with this complexity? These questions are discussed in what follows.

4.3.1 *When Does an Aim Have Social Relevance?*

If one discusses with researchers why they use animals for research, there often is no single answer. For instance, in the case of the animal experiment in which periodontal disease is induced in laboratory rats (see Section 4.1), the aim is increased scientific knowledge, but the context and final aim of this research is to understand how exposure to high levels of corticosteroids affects disease development. The latter is also of social relevance because it can contribute to improved treatments and lead to a better health status of humans. This shows that there often is not a clear watershed between the scientific and the social relevance of use of animals in research. One can even stress that science is of public importance too and thus has social relevance.

Nonetheless, the EU-directive and the compulsory ethical assessments of animal research use the distinction between the scientific and the social relevance. This does not deny that research as such can be socially relevant, but it stresses that animal research can contribute to other public goods and therefore have social relevance. This is important because it entails that the evaluation of the relevance of a specific animal test is beyond the (global) research community. It requires public participation.

Research projects aiming to contribute to social and moral values, such as human health and safety, animal welfare or environmental safety are said to be of social relevance. It might be indirect by requiring time and efforts in several steps. For example, the development of genetic diagnosis of bovine embryos (case 1) can contribute to protection of traditional breeds by minimizing the risk of inbreeding. In other cases, innovations might lead to more efficient handling of nature resources and public goods opening for economic redistribution in the public sector. Actually, all research projects presented in Section 4.1 claim social relevance in either the short or the long run. For instance, the project that aims to test the effect of glucocorticoids on acute graft-versus-host disease is linked to the value of human health. Similarly, the project that focuses on the efficacy of vaccinating broiler chickens against Newcastle disease claims social relevance as it is linked to animal health and food safety. However, a relevant aim alone is not sufficient basis for an ethical justification; the likelihood to achieve the aim and the animal suffering required to do so also need to be considered.

4.3.2 *Problems of Probability and Uncertainty*

In order to make an ethical assessment, we need to evaluate the societal relevance of the project. That, however, is easier said than done. A first hurdle has to do with problems of probability and uncertainty. Research with animals is evaluated before the actual experiment takes place. Therefore, one can never be completely certain about whether the direct or final aim will be reached. There is always an

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element of uncertainty and probability. Suppose we would agree that a certain aim is of high social relevance, for instance a method that prevents the development of amyotrophic lateral sclerosis (ALS). Then the ethical assessment of the animal use still requires an assessment of the probability that this aim will be reached by the envisaged steps taken in a project. Therefore, one can have serious objections against an experiment with a clear social significance if there is a low probability that this aim is actually reached, e.g. given the choice of the research design.

This picture is further complicated by the fact that one project can have various aims. The research examples presented in Section 4.1 have clear goals, but if one takes a closer look, it is possible to discern various aims in each of the examples. For instance, in the case of the project on Newcastle disease, the aim is primarily on animal health, but also includes aims linked to improving the level of food production. Vaccine development aims to improve animal health, which in turn may reduce the risk for transmission of zoonotic diseases from animals to humans, and in the case of bacterial infections (Newcastle disease is caused by a virus) also reduction of the use of antibiotics in animal production. Therefore, it is necessary to take the relevance and the probability of all the aims of a project into account. For instance, if researchers indicate that they aim to contribute to the development of improved therapeutics for colon cancer, it is likely that the aim will be assessed as very relevant. However, given the scientific and practical complexity related to drug development, it remains uncertain whether they will succeed, even if the researchers have well-defined hypotheses and perform their experiments carefully. The chance that they reach their additional aim, e.g. to validate their newly established animal model, is much more likely. However, notwithstanding the relevance of good animal models, it scores lower on societal significance because it has mainly instrumental value that is related to the value of knowledge. This example shows that although it is possible to judge the benefit of research, the interplay between probability and relevance makes it quite difficult to come to clear statements.

4.3.3 *Assessing Social Relevance: Where to Start?*

Now it is possible to move to the question of how to assess the social relevance of a project. To answer that question we first have to deal with the question of where the discussion on social relevance of an animal research project should start. In a discussion of the social relevance of animal research, one is often confronted with different opinions. One reason for this is that the question of the relevance of a project can be discussed on many levels. To get a better grip on these discussions, it helps to differentiate between three related levels:

(a) the societal context or background of the animal research;
(b) the final aim of the animal experiment;
(c) the direct aim of the animal experiment.

Concerning (a), animal research often starts in a specific societal context such as the increased incidence of obesity-related health problems or the role aquaculture can play in securing food security. This, for instance, is the reason why a project gets funding or media attention. At this level the relation between public moral values and ethical principles often is relatively clear. However, in most cases the problems at stake appear to be too complex to be solved by one research project. If we take again the example of vaccinating broiler chickens against Newcastle disease, one could introduce this project as part of the wider development towards sustainable food production. This latter ambition will probably be considered by many as an important and valuable aim. Nonetheless, a mere reference to this overall aim will not suffice to judge the social significance of a project on the efficacy of vaccinating chickens. It only works if the relation between striving for sustainable food production and the specific project can been explicated. However, this is not an easy task. On the one hand, to indicate how vaccinating animals contributes to sustainability is difficult in empirical terms, because both immunology and sustainability are highly complex fields. On the other hand, the

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plurality of definitions of sustainability, views on the role animal production can play and ideas about animal health indicate that there is more than an empirical challenge: there is an ethical problem. The discussion is about values and value conflicts. For instance, the researcher may stress that his project clearly has social relevance because of the importance of healthy animals for sustainable food production, while someone else stresses that the social relevance of this project on vaccination is rather limited because it still starts in the current poultry industry and overlooks the need of a more fundamental change to sustainable food production. Such differences or conflicts cannot be easily solved in the context of animal research. They are better addressed at the level of public debate, science policy or politics. For this context, it is important to note that one has to be careful when referring to broad societal challenges in order to stress the social significance of a specific project.

This leads to the second level, (b), at which the social relevance of a project can be discussed. This focuses on the final aim of the project. In our case, one could define this in terms of the aim to develop a vaccine that confers effective protection and therefore to prevent poultry from dying due to the disease. This, however, suggests two aims: less incidence of Newcastle disease and the market introduction of new vaccines. It is obvious that at this level the relation between the aim and the specific project is much stronger than on the previous level. However, there still are uncertainties at this stage. For instance, if the final aim is market introduction of new vaccines, the question whether this aim will be reached does not only depend on the success of this animal research. It requires more research, a long registration process with the authorities and dealing with market circumstances. For the debate on the social relevance it also touches upon issue of the double aim. Most of us will value healthy animals, and if vaccines can contribute to that value, this appears useful. However, we already have vaccines for chicken available. This raises the question: what is the added value of another vaccine? Does it really contribute to the health of the animal or is it more a matter of product development? In practice these questions do not have an easy answer, because it often is not an either-or issue. However, reflection on this question is very important because it is of direct influence on the assessment of an animal research project.

Finally, regarding (c), some argue that the best way to address the discussion on the relevance of an animal experiment is to start with the direct aim of the research. In our case it is the aim to study the efficacy of vaccinating chickens against Newcastle disease. This focus provides us with a better grip on the question about the definition and the feasibility of the aim. If the experiment is well described, it is easy to define what the researcher will do with chickens and why. However, to assess the answer to the question of why, we have to return to other levels. When considering the social relevance of animal-based research, the efficacy of a vaccine cannot be separated from broader questions, such as: 'Why are vaccines important?', 'Why do we need more vaccines?' or 'Why should we have chickens for food production?'

The discussion of the three levels shows the complexity of the assessment of the social relevance. This, however, should not lead to the conclusion that it is impossible to assess this part of the benefit of animal research. It only shows that it requires careful reflection of the answers, and awareness of the level at which one discusses the relevance of a project.

4.3.4 *How to Value the Societal Relevance?*

As a final step, we need to discuss the question of how to value the societal relevance. An obvious answer would be that social relevance is the same as what the society or members of the public consider important. To a certain extent, public opinion is indeed an important parameter. Nonetheless, there is more to say. First, a lot of research projects focus on topics where we lack a clear public opinion. This can be the result of the novel character of the research, for instance in the case of studies that may lead to new treatment for a recently

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discovered disease. It also can be because of a genuine plurality in society, for instance with regard to the use of gene technology. In these cases it is not (yet) possible to rely on the public opinion.

Second, there are ethical reasons why one should take a broader perspective on social relevance than a mere reference to what the public considers to be important. In ethics, impartiality, consistency and coherency are considered to be indicators of quality. This implies that one takes a perspective that includes the interests of other parties into account, that one addresses and assesses equal cases equally, and that one has a view how one's assessments relate to each other. In practice this implies that it is important to indicate who can potentially benefit. The potential beneficiaries should be conceived in a broad sense, including individual human persons, society, individual animals, animal species, nature and the environment.

Third, it is relevant to explore the ethical values at stake. They have many sources and mirror different focus points in a society. Examples include universal rights such as justice or righteousness, which matter in e.g. decisions on how to distribute research funding; utility or maximization of common good, which is relevant in relation to e.g. research objectives; perfectionist ends of self-development which may influence work environment and publication strategies; and, of course, individual projects to which one is committed (Nagel, 2012). Acknowledging this background makes the argumentation less susceptible to arbitrariness, because it is possible to explain and support why certain values are important.

Finally, the reference to potential beneficiaries and values helps to trace potential conflicts. In the case study of the efficacy of vaccinating chickens such conflicts may occur between the value of economy and animal health, or between the interests of the farmer and those of the pharmaceutical company.

These three steps will not result in objective outcomes, but they enable to understand nuances in different perceptions, explain and support one's view on the social relevance of an animal research project and make a dialogue possible. These are essential steps in the

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assessment of the social relevance of an animal experiment and for the broader question of the ethical assessment of animal research in general.

QUESTIONS FOR DISCUSSION AND REFLECTION

1. Describe your own research, or animal-based research that you are part of or know well, using the same structure as used for the six examples given in this chapter, summarized in Table 4.1. This description will be the basis for the questions that follow.
2. How would the different ethical theories evaluate that research? What aspects are of core relevance in each of the theories?
3. Describe and reflect upon the potential benefits that could grow out of that research and compare them to the potential harm and welfare loss experienced by the animal.
4. What values should govern the understanding of what is 'socially relevant' in that research? Are there other socially relevant values?

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