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and tools for implementation**

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and tools for implementation

Christian Gamborg, Anna Olsson & Peter Sandøe

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CODE_EFABAR
Code of Good Practice for Farm Animal Breeding Organisations

ETHICS REPORT
Farm animal breeding related ethical concerns
and tools for implementation

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Copenhagen, September 2005**

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0. Preface

This report is part of the EU-funded Specific Support Action – CODE_EFABAR, Code of Good Practice for European Farm Animal Breeding and Reproduction – (2004-2005).

The aims of the report are to identify what in farm animal breeding give rise to concern in the general public and among other stakeholders, to give a systematic account of the ensuing ethical problems related to farm animal breeding, and to identify and critically discuss possible tools for handling ethical concerns in farm animal breeding.

The report synthesises existing knowledge about public perception of farm animal breeding and technology, about current breeding related legislation and about key ethical concerns, building on material and extending previous work carried out in the preceding projects – ELSA (1998-1999) and the SEFABAR Network of Excellence (2001-2003) – by the Danish Centre for Bioethics and Risk Assessment (CeBRA).¹

¹ The authors acknowledge the useful input and comments on an earlier version of this report from the CODE_EFABAR involved breeder and breeding companies representatives, in particular Margareta Håård, Hans Stålhammer, Hein van der Steen, Pieter Knap and Volker Schulze as well as input from DG SANCO and DG Research.

1. Introduction

Farm animal breeding involves the selection of the most suitable animals in order to produce future farm animals. The tremendous growth in especially productivity of the farm animals has added to human wealth. It has also allowed farmers to make good use of the natural resources at their disposal. However, farm animal breeding has also had a negative impact — on animal health and welfare, and on genetic diversity. One of the often raised problems in modern farm animal breeding and reproduction is that if breeding programmes have a stronger focus on a single trait, such as a productivity-related trait, other characteristics may more easily be neglected or ignored. This may have a negative impact on, for example, animal welfare and genetic diversity — an impact likely to give rise to complaints and worries among those who work within the food chain and the rest of the agricultural sector, stakeholders outside agriculture, and the general public.

There are examples where a broader breeding goal has been maintained, focusing not only on production related traits but also e.g. health related traits, such as the Nordic dairy cattle breeding programs for the past thirty years. Also in other species and countries, usually several traits are combined in a total merit index, and increasingly breeding companies work towards more, so-called, balanced breeding, including functional traits.

Nevertheless, this problem raises three questions. *First*, what do stakeholders believe to be the problematic aspects of present-day farm animal breeding and reproduction? *Second*, what sort of ethical balancing needs to occur if potentially conflicting concerns are to be properly addressed? *Third*, how can these concerns be both addressed in practice and accommodated?

In other parts of the livestock sector (such as animal production, slaughter and transport) and beyond, legislative measures have been shown to complement internal market regulation reasonably well. However, the regulative framework has not been particularly effective in the farm animal breeding sector.

European attempts to adjust legislation to deal with the issue of animal welfare and breeding face two problems. First, it is not clear what the current legislation (in this case, Directive 98/58/EC concerning the protection of animals kept for farming purposes) actually requires of the breeder. As a result, farm animal breeders are sometimes uncertain whether they are meeting their legal obligations. Second, it remains unclear how to put this kind of legislation – and the intentions that appear to lie behind it – into

practice. According to the FAWC (2004) there is no case in which the legislation has been used successfully to restrict a breeding procedure.

One explanation, other than the Directive is more orientated towards farming purposes, for the situation of lack of legislative effectiveness is that – unlike other areas related to livestock production – the Council Directive has not been followed by more specific regulation.

Besides the internal regulation of the market and legislation, voluntary measures should be considered, especially for concerns which have no identifiable price or are for other reasons unaffected by market forces. In the projects such as the ELSA project breeders identified what they considered to be some of their most important concerns. During the SEFABAR network — which involved breeders, animal scientists, social scientists, animal welfare organisations and ethicists — breeders tried to tackle some of these concerns using the conceptual framework of ‘sustainability’. The present project, CODE_EFABAR, represents an attempt, by breeding organisations, to deal with some of the pressing breeding-related ethical questions and key concerns by developing a code of good practice for farm animal breeding and reproduction.

Even if breeders were to succeed in developing and adopting a code of good practice, and even if this in turn were to lead to addressal of some of the key concerns and ethical issues connected with breeding practice, the need to communicate these results would remain pressing. For breeders will need to show, to a wider audience, what concerns they have considered and how they have balanced the conflicting interests. This will be no small task, since for many stakeholders, farm animal breeding is difficult to separate from the rest of the food chain. Many of the ethical issues raised by breeding are most readily examined by stakeholders with knowledge of the science and/or practice of modern-day breeding. However, in a few cases, such as the case of leg problems in broilers caused by bred-for acceleration in growth, a broader section of society may be informed about the relevant ethical, breeding-related problem.

In dealing with ethical issues through adopting a code of good practice, it is important to adjust expectations to realities. Unresolved conflicts are bound to remain since different stakeholders will have different values. There will still be discussions about what, in general terms, should count as an ethical concern, and about what the actual key concerns are — animal welfare, competitiveness, food safety, diversity and so on. And arguments about the balancing of any identified concerns will almost certainly continue. This is not something to bemoan, but rather something to anticipate and be honest about. It will be possible to live with the disagreements, as long as a framework for discussing ethical concerns in modern farm animal breeding and reproduction is in place.

2. Public perception

Generally, farm animal breeding and reproduction does not feature very prominently on the food perception agenda for consumers and other stakeholders at the receiving end of the food chain (van Genderen & de Vriend, 1999). One of the reasons being that the breeding part of the product creation process is not very discernible as opposed to the quality of the end product or even as the way the farm animals are kept. On the other hand, studies have been made which try to gauge public perception of certain types of technologies – especially animal biotechnology such as genetic modification or cloning, which might or might not be used in the breeding and reproduction process. The so-called ‘Eurobarometer’ surveys – and interview studies made in conjunction with these surveys – give an indication of public perception of animal biotechnology.

In the preceding SEFABAR project (2001-2003), smaller surveys were made directly concerning farm animal breeding. In one of the studies, the attitude of key persons in government, agricultural policy and breeding organisations to farm animal breeding and reproduction was gauged in six countries – Norway, Italy, France, the Netherlands, Thailand and USA (Schakel & van Broekhuizen, 2003). This survey more looked at the future characteristics of breeding. Moreover, also a result of the SEFBABAR project, public perception, i.e. the opinion of the consumers and citizens, in some of the European Union member states (France and the UK) was surveyed. In turn, we will briefly recount the results of the various surveys and studies.

2.1 Differences in attitudes to breeding

As a result of the ELSA project on the ethical, legal and consumer implications of farm animal breeding and reproduction, a small survey in the format of questionnaire was made among 50 consumer and 11 animal welfare organisation – however only one fifth of these responded (van Genderen & de Vriend, 1999). Most of the participants in the survey thought that animal breeding and livestock production are important consumer issues, and that the ethical aspects of animal breeding were important consumer issues as well. A drawback of the survey, however, was that it is not possible to see what was actually meant by the term ‘ethical’.

The survey also gave information about acceptable or un-acceptable breeding *techniques*. Reproduction techniques such as artificial insemination and freezing of semen were considered acceptable for most participants. However, techniques such as heat induction, embryo transplantation, cloning, sperm sexing and triploidisation were not seen as acceptable by the respondents of the survey. In some cases, however, a larger

percentage expressed that they did not know what the techniques and their implications were. According to van Genderen & de Vriend (1999) the benefits of new products and breeding should be demonstrated to the general public. Moreover, consumer concerns especially in relation to the little publicly supported genetic modification of animals should be tackled with more openness and through improved dialogue.

2.2 Public perception of farm animal breeding and reproduction

Consumers may in general have poor knowledge about breeding and reproduction procedures. However, according to a study of Ouedrago (2003) as part of the SEFABAR project, consumers were concerned about the impact of breeding practices on their food items although participants rarely spontaneously mentioned breeding as food related concern. The type of concerns which were raised by participants of the survey included safety, healthiness, food quality, animal welfare and consequences on the environment. Most participants expressed wishes of safer, healthier and better quality food than they experienced at present. To some degree, it seemed from the survey that production and breeding and reproduction issues were mixed up. The survey was based on so-called focus group interviews in the UK and France.

The participants were also asked to consider efficient measures to reconcile consumers with modern breeding and reproduction practices. The three major strategies which were discussed concerned the education of consumers, minimum standards of breeding and reproduction across the EU, and labelling. A majority of participants expressed interest in, and considered it a right to know how animal-based products were, not only produced, but also bred. Minimum standards were perceived as a very important measure. Likewise was a compulsory labelling scheme, yet the question was how to make such a scheme efficient.

The survey also revealed that where most participants raised ethical objections were in relation to the use of animal biotechnology. Across the groups interviewed, a consistent concern was related to GM food and modern biotechnology used on farm animals (ibid.). However, most participants had difficulties in articulating and focusing their actual concern.

2.3 Public perception of animal biotechnology

According to several studies, summarised and analysed by e.g. Lassen & Sandøe (2003), the European public is worried about animal cloning and other forms of animal biotechnology. For the general public, animal biotechnology does not exist in a vacuum but coexist with other uses within agriculture (and the medical area). Lay perceptions of new biotechnologies within the EU have been monitored through the so-called 'Eurobarometer' surveys consisting of identical national surveys in each member country. In

each survey, people are asked to consider usefulness, risks and moral acceptability of biotechnology and specific applications. As stated previously, in some cases interviews (so-called focus group interviews) with representatives of the general public were made in conjunction with the European wide surveys.

One major message of the Euro-barometer survey was that one of the least acceptable applications was animal application such as cloning and genetic modification of animals such as sheep to get milk which can be used to make medicines and vaccines. In general, in the surveys, food applications of biotechnology were assessed much more negatively than non-food applications (medical applications being assessed most positively).

According to follow-up interviews, which made it possible to go into more depth of some the conclusions derived from the general Euro-barometer studies, for example regarding cloning, even if there were useful applications and advantages, cloning was considered to be – in the words of the interviewees – “against nature”, “unnatural” and threatening “the natural order of things” (ibid.). Most lay people interviewed agreed that animal cloning was not necessary, i.e. it lacked in real usefulness.

In relation to food applications of biotechnology, the interview studies showed that although a general fear for eating GM foods was not displayed, (human) health risks were an important theme in the food discussion. Most, if not all participants expressed views about e.g. genetically modified lean pork to lack usefulness, reasoning that other solutions to the fat and health problem are abundant, such as eat less, eat different food, avoid the fat etc.

The apparent worries about animal biotechnology can not, according to Lassen & Sandøe (2003) be explained simply in terms of a lack or distortion of factual information. Among the more informed public, as it turned out in the studies, were the Danes, who also at the same time were among the more sceptical towards animal biotechnology. The public typically has a broader sense of risk than scientists but a more narrow perception of what is useful (especially that it has to involve more than commercial usefulness). The public, however, also express some concerns, which might be labelled ‘moral’ – i.e. here in a broader sense of concerns, which cannot easily be explained within the frame of e.g. risk and usefulness.

To get a better sense of farm animal breeding and reproduction and associated modern technologies it is helpful to more systematically contemplate the types of ethical concerns raised by the public perception and other concerns, which might become cause for anxiety – and which are associated with the breeding and the ensuing techniques.

3. Ethical concerns

To date, breeding programmes have delivered animals that produce in a more efficient way, e.g. better feed conversion, with obvious advantages for both farmers and consumers. But there are also negative side effects of increased productivity, as it is becoming increasingly apparent; and it is our growing understanding of this negative impact that has raised questions about what is ethically acceptable in animal breeding (see e.g. Gamborg & Sandøe, 2003).

Production traits such as milk yield or growth rate are easy to measure and have high or intermediate heritability. Production traits have a crucial impact on the farm's profitability — hence the strong focus on these traits in selective breeding. Efficient breeding programmes, combined with improved understanding of animal nutrition, disease control and better designed housing systems, have resulted in a dramatic increase in productivity during the second half of the twentieth century. A prime example here is the growth rate and feed conversion efficiency of broiler chickens: from early in the 1960s to the late 1990s the time needed to produce a slaughter-weight broiler decreased from 80 to 30 days and the feed consumption halved (e.g. Christensen, 1998).

The drawbacks of increased production and of the narrow focus on production traits include compromised animal welfare and loss of genetic diversity. So the question arises whether economically motivated animal breeding which carries costs in respect of loss of genetic diversity and compromised animal welfare is ethically acceptable.

Moreover, independently of this question, the debate over new genetic and reproductive technologies has prompted discussion about what should and should not be done to animals and their genomes – be it through traditional selective breeding or through the use of newer techniques such as transgenesis. The key questions here concern the limits of acceptable practice in this area of technological development, and who should set these.

Another related ethical issue concerns who to consider responsible for current practices. Food safety is considered a key concern in breeding by most stakeholders. Possible breaches of such safety not only arise in the production part of the food chain but may in some instances also be traced back to the breeding sector. This is the case with e.g. Salmonella arising from brooding-houses where the breeding companies have the responsibility for supplying the livestock, and with these also the pathogens, into the production system, cf. Davies et al. (2003), Opinion...(2004).

Transforming the ethical considerations mentioned above into action may be facilitated by the use of the notion of sustainability. In this report, we use the term ‘sustainability’ in a wide sense to indicate a general framework endorsed broadly by stakeholders and the rest of society for addressing ethical concerns relating to the management of natural resources.

3.1 The nature of ethical questions in breeding

Ethical problems relating to breeding differ markedly from those connected with the way animals are kept by the farmer (Sandøe et al., 1999). The ethical issues raised by animal husbandry concern *existing* animals. The relevant question is: how should we treat the farm animals in our care? Answers to this question needs reflection upon the handling and management of animals, and more specifically about housing systems, the opportunity to exercise ‘normal’ behaviour, the incidence of disease and so on. Moreover, bearing in mind that some of the ways animals are kept have a negative effect on the animal welfare, what kinds of treatment are acceptable in the efficient farming of this animal?

By contrast, ethical questions concerning farm animal breeding relate to *potential* animals. The relevant question is: what sort of animals should there be? To answer this question we need to clarify the purposes for which it is acceptable to alter the genetic composition of animals (to a greater or lesser extent) in order to improve their utility to us. And we need to ask what kinds of concern should be considered in this connection. To some observers the mere thought of intentionally changing genetic composition through breeding is ethically unacceptable. Interfering with the ‘natural’ selection process is perceived as ‘playing God’. A more widespread and moderate attitude to breeding runs as follows. We cannot undo our earlier interventions into the animal kingdom. Farm animals are in any case already domesticated and recognisably distinct from their wild relatives or ancestors. So the key ethical question is not whether we should abandon animal breeding but how we should breed (see also Gamborg & Sandøe, 2003b).

3.2 Types of concern

As evidently identified and discussed in the SEFABAR network, a multitude of ethical concerns can appear to be of relevance to modern farm animal breeding and reproduction (Gamborg & Sandøe, 2003) and to the sustainability hereof.

The most pressing concerns about modern farm animal breeding and reproduction include:

- animal welfare
- animal health

- ❑ animal integrity
- ❑ biodiversity
- ❑ resource use and environmental effects
- ❑ consumer safety (esp. food safety)
- ❑ food quality
- ❑ competitiveness.

Most, if not all, farm animal breeding takes place in a market setting. Consequently, clear-cut production traits or concerns, and perhaps food quality are bound to have an advantage by, all things equal, increasing the *market* value of the product. However, other concerns may lack an immediate market value. Here, a distinction must be made between price and value. Some values (e.g. productivity) can be, and are, priced whereas other values (e.g. animal welfare) are not directly priced. Other things equal, values which are priced can far more easily be promoted than values not priced. Consideration of e.g. animal welfare may be valued by different stakeholders, including breeding companies, but animal welfare does not render any tangible benefit to the consumer – as would better quality (e.g. leaner meat) – and there are no, direct visible signs of improved animal welfare. Consequently, these concerns and related characteristics are difficult to use as a basis of choice among, e.g. consumers.

Obviously, there are always trade-offs involved in the breeding process, e.g. between price of the product and the quality of the product. However, these trade-offs are easier to make when there is a direct market price attached. It becomes far more difficult to regulate the balance between concerns or traits with a price (e.g. quality) and those without (e.g. animal welfare), or even between different concerns or traits without any price (e.g. animal welfare and biodiversity) via markets mechanisms only. Thus, there is an inherent conflict in the sustainability framework utilised in a commercial context; things which have an otherwise ethical significance, such as diversity, welfare and integrity, are less valued.

The different concerns give in themselves and in potential conflict with each other, rise to ethical dilemmas. In scientific and public debate three (as it were) auxiliary topics are repeatedly raised when modern breeding and reproductive technology are under discussion. These are: animal welfare, animal integrity and biodiversity. In addition to these concerns, environmental protection and resource use as well as (food) quality and safety obviously play an increasing role in breeding practices, and at least, in the public perception of these breeding practices. In the following, some of these concerns, including also resource use and environmental effects, and their relevance to breeding are briefly considered – not, however, aiming at reviewing the comprehensive literature available,

but recapitulating some main points and issues. Not all concerns will be addressed here as they are not equally well-described in the literature – one example being food safety (e.g. in relation to poultry and salmonella) where documentation is lacking.

Animal health and welfare

Selective breeding focusing only on production traits has led to great increases in productivity (e.g. in dairy cattle) and, (more generally, in growth rates and more efficient feed conversion, but there is evidence in several species that it has generated health problems (Rauw et al, 1998) – and thus a conflict between two ethical concerns of relevance for the sustainability of farm animal breeding.

In dairy cows, high milk yield is to a considerable degree connected with raised levels of mastitis and some reproduction problems.² In broiler chickens, high growth rate is connected with leg problems (Christensen, 1998). Whether animal welfare is defined in terms of the animals' subjective experience or as their health and biological functioning (see Fraser & Duncan, 1997), these problems will involve reduced animal welfare. There is a connection between breeding and welfare in the currently used production systems. An example is feather-pecking in laying hens and tail-biting in pigs which may be influenced by breeding (see also FAWC, 2004; Kolar & Rusche, 2003 for more extensive consideration of welfare implications of animal breeding).

Breeding companies can play an important role in addressing welfare problems of both types by defining broader breeding goals – goals that include not only production traits but also functional traits, as is already done in cattle breeding in the Nordic countries (Christensen, 1998). For the last 20 years, welfare surveillance to animal breeding strategies has been in terms of integrated databases and comprehensive recording schemes for cattle and pig breeding. Here, it has been shown how it is possible to make breeding more profitable whilst taking broader concerns, such as health, into consideration, e.g. the total economic gain from selection for a Total Merit Indices (TMI) in dairy cattle has been shown to be 10-25% more than when selecting for a single trait *and* despite a reduced gain in milk production levels. However, when it comes to e.g. leg problems in broiler chickens, there is no apparent economic gain to be seen from avoiding the se leg problems. Hence, there is less immediate, economical impetus to take into account other concerns, such as animal welfare, into the breeding goal. Nonetheless, it is important to consider the potential interactions between specific genotypes and environment on welfare in breeding programmes.

² Phenotypically, however – and thus associated also with management – less productive herds with poor udder health can be found as well as examples are plentiful of dairy herds with high production combined with good udder health and general health.

The techniques used by breeders have also been subjected to ethical examination. Modern technologies (used in addition to, or instead of, traditional mating) include long-used and generally accepted techniques, such as artificial insemination, at one end of the spectrum, to relatively new and more controversial techniques, such as ovum pick up (TVOR) which is nonetheless applied in some countries, e.g. the Netherlands, to the often highly controversial techniques, such as cloning and genetic modification, at the other. Many of the latter are still used only on an experimental basis. Examples of successful application in farm animals are rare.

Welfare problems related to modern technologies relate to unexpected consequences of the utilisation of the techniques which might lead to animal diseases, infirmity or disabilities – and thus a decrease in animal welfare. For example, welfare implications of cloning concern oversized offspring, embryonic and foetal losses (only 3% of the transferred cloned embryos develop in to viable calves) and birth abnormalities as well as the possible problems with aged DNA (FAWC, 2004; FAIP, 2003).

In 2001, a Royal Society Report (cited in FAWC, 2004) summarising the technical barriers to be overcome for GM livestock for food production to viable concluded that the commercial development of GM animals for food was unlikely to progress unless not only technical and regulatory issues but also ethical issues as well public concern are addressed.

Animal integrity

In taking increased consideration of the farm animal, there is something more at stake than which may be captured by animal health or animal welfare. This was apparent not so long ago regarding the breeding of a featherless broiler chicken. Although the research team behind the bird argues such broilers are more resource efficient and do not seem to suffer from welfare problems, there is in most people's opinion something wrong or objectionable about breeding the bird. Featherless broilers lack one of the essential characteristics of birds; their *integrity* has been violated.

The notion of integrity has been defined in different ways – and remains unresolved – but here we use it as something more and else at stake than animal welfare. The integrity of an animal can be violated without the animal feeling any pain or in other ways experience reduced welfare (Ministry of Science, Technology and Innovation, 2003). It is probably more a concern which is related to the animals than us as humans. Violating the integrity of an animal does not imply that we as humans are at risk or our aesthetic sense is provoked. When animal integrity is violated it means that the animal is affected

beyond welfare in a way which many people find troubling. Thus the notion of integrity tries to capture the sentiment that we should leave animals as ‘natural beings’, i.e. not as a product of human ingenuity.

While the genetic selection itself may be generally acceptable, questions arise about the degree of manipulation and the things concerning the genotypic and phenotypic make-up. Is it at all acceptable, ethically speaking, to alter the genome of animals according to the needs and desires of farmers and the market? Some would say ‘no’, as can be seen in the response of several animal protection associations to questions about the general acceptability of breeding endeavours (Kolar & Rusche, 2003). Several respondents here found breeding acceptable only if it was targeted at improvements in the health and welfare of animals.

With regard to the use of reproductive and genetic *technologies*, concerns also include something “more” than animal welfare, i.e. interference with aspects of life which are not for humans to tinker with (i.e. the allegation that we are ‘playing God’), and the violation of genetic integrity (Sandøe & Holtug, 1998). Thus, although there are no apparent welfare implications of the use a technique there seems to be a concern which has been articulated in FAWC 1998 cloning report as “an attitude may be developing which condones the moulding of animals to humankind’s uses, irrespective of their own nature and welfare” where the cloned animal is seen as a manufactured being. (Cf. Section 2 in this report on public perception of modern biotechnology).

Biodiversity

Another of the main concerns is that intensive selection may lead to the loss of genetic diversity when a few genotypes of particularly high breeding value are concentrated upon and put to heavy use. Some decisions over the animals to be selected for reproduction are taken by breeding companies and have a decisive effect on the genetic diversity of livestock; on the other hand, in open breeding systems local breeders and breeding cooperations are part of the decision making process, and hence bear part of the responsibility for either limiting or expanding the genetic base. Both examples can be found in dairy cattle breeding: on the one hand artificial insemination enables a few bulls to sire offspring all over the world, on the other hand the decisions to use these bulls are ultimately taken by each individual breeder. In closed systems, such as broiler breeding, where the end product, so to speak, is sold, decisions are taken by the breeding companies. Typically, breeding programme and commercial production is more integrated in dairy cattle than in other species such as pigs or shrimps.

When less productive local breeds are replaced by high-yielding and thus more profitable breeds, genetic diversity may decrease. In the longer term, a narrow genetic base may result in loss of production safety if the few, commercial breeds encounter health, productivity and other problems. This will mean a loss for the agricultural sector and subsequently for the national economy.

However, genetic diversity can also be seen as a value in itself. Local breeds also have value as part of a cultural heritage. However, perhaps the most important attraction of maintaining genetic diversity is the provision of a sort of insurance for the future: since we do not know what genes will be needed for future breeding goals, we should probably maintain as broad a genetic pool as possible.

Resource use and environmental effects

Resource use and the environmental effects of animal production are primarily determined by farm animals' capacity for efficient feed conversion. From this point of view, the more efficiently animals can convert locally available feeds (in particular those which cannot be used for human consumption), the more sustainable is the corresponding production system. Hence, by selecting for feed conversion related traits, breeding programmes can promote environmental sustainability.

3.3 Ways of addressing ethical concerns

The above mentioned concerns may, as stated previously, be addressed and to a varying degree implemented in farm animal breeding and reproduction practices through various means: through market mechanisms, through European legislation and through voluntary measures. We will consider the latter two in the following.

4. Tools for implementation: European regulation

For several decades, animal welfare and other ethically relevant aspects of animal production have been subject to public debate in Europe. This debate has been reflected in changes to animal protection legislation at both the national and European level. EU directives dating from 1986 now cover the on-farm, transport and slaughter conditions of several farm animal species.

The first rules on animals kept on the farm were adopted in 1986 and concerned the protection of laying hens (Council Directive 86/113/EC, replaced in 1988 by Council Directive 88/166/EEC). In 1991, Council Directive 91/629/EEC on the protection of calves and Council Directive 91/630/EEC on the protection of pigs were adopted. The

content of this legislation reflects the public debate in its focus on the way animals are housed and handled. The rules concerned animals in intensive production systems. Community legislation concerning the welfare conditions of farm animals lays down *minimum standards*. For the directive concerning primary production (but not transport and slaughtering) national governments may adopt more stringent rules provided they are compatible with the provisions of the Treaty.

Concern about the welfare consequences and other ethical aspects of farm animal *breeding* developed later, and the impact of animal breeding on animal welfare was specifically addressed in European legislation only in 1998 (Directive 98/58/EC concerning the protection of animals kept for farming purposes). Moreover, what is important to note, is that this Directive has not been followed by more specific regulation. In the following, the major legal instruments in place regulating farm animal breeding and reproduction are discussed. For other, bordering regulation, please consult the DG SANCO website (http://europa.eu.int/comm/food/animal/welfare/references_en.html).

4.1 Major legal instruments

The overall European legislative framework for the area of farm animal breeding and reproduction is the Council of Europe "European Convention for the Protection of Animals Kept for Farming Purposes". Some of the basic principles here concern animal health, welfare and environment – for instance preventing or minimising pain, injuries, diseases, fear and stress – and being able to express normal behaviour. The EU has adopted the Convention and made a Directive – Directive 98/58/EC concerning the protection of animals kept for farming purposes – in order to achieve a uniform implementation throughout the EU member states.

The European Convention for the Protection of Animals Kept for Farming Purposes

The "European Convention for the Protection of Animals Kept for Farming Purposes" was opened for signature in 1976 and entered into force in 1978 (the condition was four ratifications), with amendments opened for signatures in 1992. In 2004, the status is that all 30 signatures have been followed by ratification (Council of Europe 2004).

The convention, after the amendments, applies to breeding, keeping, care and housing of animals (Art 1). Here, animals included produced by normal breeding process and animals produced as a result of modifications or novel combinations of genetic material. Breeding procedures, natural or artificial, which cause or are likely to cause suffering or injury – such as difficult deliveries and lasting deformations – to any of the animals involved should not be practised (Art 3). However, this provision still leaves room for breeding which causes minor or momentary suffering (e.g. natural delivery or embryo

transplantation) which might necessitate e.g. caesareans. This Article does not interfere with any experimental breeding in laboratories.

Moreover, no animal should be kept for farming purposes unless it can be reasonably expected on the basis of its phenotype or genotype to keep without detrimental effects on its health or welfare (Art 3). Obviously, it is not possible to foresee everything, but what can be expected to be reasonably anticipated is considered unlawful. Moreover, by referring to reasonable expectations it means that breeding should not be made from genetically modified animals, or the animals produced by these animals, unless it could be *reasonably* expected on the basis of available scientific knowledge and/or established experience regarding animal health and welfare should not result in suffering as a consequence of the breeding.

Directive 98/58/EC

Directive 98/58/EC concerns the protection of animals kept for farming purposes. The Directive was adopted in 1998 and member states shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 2000 (Art 10). However, member states may maintain or apply within their territories stricter provisions for the protection of animals kept for farming purposes than those laid down in the Directive. According to a report from FAWC (2004) seeking to determine how the sections of European Directive 98/58/EC concerning animal breeding are interpreted and implemented in different parts of Europe, there is "no detailed regulatory framework in any Member State which addresses fully the particular problems associated with the breeding of farm livestock for commercial purposes".

The Directive lays down minimum standards for the protection of animals bred or kept for farming purposes (Art 1). Member states shall make provisions to ensure that the owners or keepers take all reasonable steps to ensure the welfare of the animals under their care (Art 3).

In the Annex to the Directive, regulation concerning breeding procedures is laid down. Natural or artificial breeding procedures which may cause suffering or injury to any of the animals concerned must not be practised (Annex, art 20). However, if national provisions allow, minimal or momentary suffering from certain procedures is allowed. Moreover, no animal shall be kept for farming purposes unless it can be expected in the basis of genotype or phenotype that it can be kept without detrimental effect on its health or welfare. (Annex, art 21)

In relation to modern biotechnology, so far, no common EU rules have been adopted regarding the development and utilisation of gene technology in relation to farm ani-

mals (Ministry of Science, Technology and Innovation 2003). In some countries, including Norway, Sweden, Finland and Denmark, there is no specific legislation concerning cloning of animals. This area is regulated through the animal protection and animal experimentation legislation. In other countries, such as the Netherlands and the UK specific legislation concerning cloning is in place (ibid.)

4.2 Problems with current legislation

The current legislation regulating farm animal breeding and reproduction, the European Convention for the Protection of Animals Kept for Farming Purposes and especially the Directive 98/58/EC concerning the protection of animals kept for farming purposes are only legislative framework and have, in general, not led to very concrete results or actions in relation to amending breeding or reproduction procedures. Council Directive 98/58/EC is a general one requiring it being transposed into national law to meet its objectives. Moreover, it provides a framework within which more detailed species specific legislation can be incorporated. For example, the farming of chickens for meat production sector is not covered by specific Community legislation; "only Directive 98/58/EC only the general requirements concerning the protection of animals kept for farming purposes. Therefore the Commission has decided to propose a specific Council Directive laying down minimum rules for the protection of chickens kept for meat production" (Commission of the European Communities, 2005).

While the Directive is mainly meant for farming purposes it does include provisions related to breeding of farm animals. However, it is not plain to see what the Directive actually requires of the breeder. As a result, farm animal breeders are sometimes uncertain whether they are meeting their legal obligations. As mentioned in the Introduction, apparently there is no case in which the legislation has been used successfully to restrict a breeding procedure.

Most importantly, the lack of legislative effectiveness apparently stems from the fact that the *Council Directive in several countries has not been followed by more specific regulation* – unlike most other areas related to livestock production. According to FAWC (2004) "Member States such as Italy have taken a similar approach to the UK in that the wording of the European Directive has been incorporated into national legislation. Denmark and Sweden have introduced legislation which allows the possibility of future controls". Offering explanations for this situation; other than most of the emphasis is put on farming purposes can only be speculative but two possible reasons may be (i) a lack of will to implement the Directive, and (ii) relate to technical problems of how

to realize the Directive, how to enforce the provisions, and how to exercise control.³ Presently, the Convention and the Directive mostly act as statements of intentions rather than actual tools to be used in regulating breeding practices.

5. Tools for implementation: A Code of Good Practice

The other main tool – besides market mechanisms and legislation – to implement different concerns in farm animal breeding and reproduction is voluntary measures. So far, attempts have been few, scattered and not enacted by a common platform, such as the European Forum of Farm Animal Breeders (EFFAB), formerly the Farm Animal Industrial Platform (FAIP).

The CODE-EFABAR project aims to develop a Code of Good Practice for animal breeding that can be signed up to by European animal breeding enterprises and organisations. The code can be joined by breeders on one's own accord, and it must be seen as a way of addressing concerns within the breeding and reproduction industry, identified by the agricultural sector and stressed by a wider set of stakeholders. Moreover, it is intended to be used to enter dialogue, and to alter, perhaps, public perception.

The code is thus for communication – as well as for managerial – use. In connection with it, it is therefore important not only to identify concerns but also to work out how they can be addressed: to examine how concerns expressed by different stakeholders can be balanced, and how to resolve conflicting priorities. It is a challenge for the presently running project defining a Code of Good Practice to identify acceptable forms of compromise between conflicting issues.

5.1 What are the main sustainability concerns of the Code?

The Code builds on work over the past six years, in two projects (ELSA and SEFABAR), involving scientists, NGOs (primarily animal protection organisations and consumers' organisations), and socio-economic experts including ethicists, sociologists and lawyers have taken up the challenge of addressing animal welfare and other ethical issues in close collaboration with the breeding industry.

In the SEFABAR project, breeders and other stakeholders represented through working groups identified what they in fact considered the most important concerns to address –

³ Day to day enforcement of Community legislation is the responsibility of Member States. Any event suspected to be a breach of Community legislation should be communicated at first to the competent authority of the Member State concerned.

in order to achieve more sustainable farm animal breeding and reproduction – and related to four different species groups: ruminants, pigs, poultry and aquaculture.

Species group	Concerns
Ruminants	Genetic diversity Use of resources Animal health and welfare Food quality and safety Use of accepted technologies
Pigs	Genetic diversity Animals robust and efficient in different conditions Animal health and welfare
Poultry	Efficient production for different markets Animal health and welfare Use of resources Food quality and safety (current and anticipated)
Fish	Environmental impact Feed resources Safety and consumer acceptability Acceptable price Animal integrity

Source: Adapted from Liinamo and Neeteson, 2001.

As can be seen, most working groups identified sustainability concerns which fit into broader categories of main breeding issues such as economics, resources, quality and diversity. Because these broad concepts; such as ‘animal welfare’ and ‘food quality’ mean different things to different people, in different cultural contexts, clarification and definition of these terms were needed in SEFABAR. Economics’ covered improving production efficiency and economic viability, over both short and the longer term. ‘Resources’ included the minimisation of pollution, and the improvement of efficiency of feed resource and land utilisation, and ‘quality’ was loosely defined so as to relate to improving product quality and food safety for consumers – and included here is also animal welfare and health. Finally, diversity’ had to do with maintenance of biodiversity, the improvement of adaptability to diverse environments and greater product diversification.

In the Code these main sustainability concerns are represented as 5 categories to consider for breeding companies and organisation – where ‘welfare and health’ has been singled out as a category of its own, and where ‘environment’ has been given its own category, thus we have:

- product quality
- genetic diversity
- efficiency
- environment
- welfare and health.

(See Section II in the Code for further definition and clarification of what is, and what is not, in these terms in the context of the Code)

In the Code each concern related to sustainability is broken down into elements which are more concrete (and often more measurable), and which are then elaborated in terms of breeding goals (resembling criteria in the C&I, criteria and indicators, model) and how the Code of good breeding practices could be made verifiable.

It must be noted, however, that although the general concerns may be the same, the elements differ. Moreover, as it was also experienced in the SEFABAR project, the actual prioritisation and attention to concerns also vary across species groups.

Moreover, it is important to make sure that the elements which are put under the categories actually address stakeholder views about what can be found in a certain category, and not just what the breeding industry perceive it. For example, a concern like “environment” elements like “robust animals” or “efficient production” in aquaculture is not what is generally perceived to be an issue of environment. Such elements may well be included, however, there is also a need for going beyond that and consider other elements or if some explanation needs to be provided.

When breeding goals are conflicting it is necessary afterwards to discuss how to deal with the conflict. Either this is done specifically for the goals where such conflicts are perceived, or it is done in a general statement. Compromise or trade-off situation need to be openly described, bearing in mind, though, that being transparent has to do with not promising more than can be done. The question is – what the breeders can in fact do.

5.2 Can breeders solve the ethical problems?

Animal welfare issues, in combination with growing understanding of the undesired side effects of breeding programmes, have directed attention to the role of farm animal breeding. The three network projects (ELSA; SEFABAR and CODE_EFABAR) apparently grew out of a need, felt by the breeders, to understand the ethical issues so as to be able to deal with them. Breeders are aware that their credibility depends on their being

able to enter into productive dialogue with, and react to the concerns expressed by, stakeholders throughout Europe.

Undoubtedly, in a society increasingly concerned about the ethics of management of sentient animals and natural resource use, it is important that breeders take responsibility for their part of the chain of production. The main questions concern ways in which breeders can account for ethical issues in actual breeding practices, influence future developments and enter into a dialogue with the other stakeholders.

The concept of ethics has wide application. So if it is to be applied in practice it will be important to define concerns and to translate them into breeding goals. This is where the notion of sustainability can be useful: it helps breeders to present their achievements in a more understandable manner and to communicate their concerns to a wider audience in a clear way (Gamborg and Sandøe, *in press*). A great advantage of putting sustainability in the foreground is that it obliges decision makers, in and beyond the breeding sector, to combine concerns like health, welfare and the preservation of genetic resources in a *unified perspective* (ibid).

Different interest groups do not always agree over definitions and certainly do not agree on the prioritisation of concerns. The breeding associations emphasise productivity and product quality; for some of the animal protection associations, on the other hand, animal welfare should be the main focus of farm animal breeding. To some extent, these conflicts can be resolved through technological compromise: with a sophisticated approach, it may be possible to include both production and health and welfare in a breeding goal. When no such compromise is available, transparency about the various positions is important for credibility.

Developing a Code of Good Practice in relation to farm animal breeding and reproduction means taking three kinds of concern into account. One type is concerns and related traits (such as production, productivity and robustness traits) which have direct economic (positive) consequences and which – in general – have been taken into account. The second type is concerns and related traits (such as quality and food safety as well as health related traits) which have *in-direct* beneficial economic consequences, i.e. which may lead to greater profitability even at the expense of e.g. productivity. The last, and most difficult type of concerns and related traits to consider, is the one where it is difficult to see any clear economic positive benefit arising from the inclusion of such traits, e.g. for animal welfare, animal integrity or for biodiversity.

With regard to these three types of concern, the Code is likely to have an impact on the two first types of concern. With regard to the third, less apparent type of concerns the

problem is that what is demanded from other stakeholder side has no direct market value, and hence breeding companies may be less prone to include traits of consequences for addressing concerns like animal integrity and biodiversity. However, there may other, indirect, less tangible, nevertheless important reasons to consider the inclusion of such traits – such as increased or maintained credibility and increase or maintenance of market shares.

For the companies concerned, breeding is an economic activity in a market. Companies need to be competitive in a market that, for some species at least, is truly international; they need to be able to produce animals that farmers want to buy. Livestock farmers also have to run profitable and competitive enterprises, and therefore they will turn to breeders who can provide them with the animals that best serve this purpose. Consequently, traits directly raising productivity and/or product quality will be the main economic priority for the breeding companies. Just how much other traits can be given consideration strongly depends on economic considerations.

Some non-production traits, such as those relating to animal health, are easily introduced into breeding goals, because their inclusion is not costly and is often even economically beneficial. But obviously, to bring traits that confer no obvious economic advantage into the breeding goal will carry a monetary cost (among other things, it may slow down the breeding progress for traits that directly affect producer income). The question is how to cover these costs. One option is through product-pricing. However, as Appleby et al. (2003) point out, this places a heavy responsibility on the individual consumer at point of sale; and the fact that breeding is only a small part of the food chain may make it difficult to convince the consumer of the desirability of the relevant price rises. Another possibility would be for major processors and retailers of food to focus on ethical issues because of the positive effect this may have on these companies' brands. However, in real life the focus will inevitably be on a few salient parameters that are cheap and/or matter to a broad cross-section of consumers. The main breeding issues can only to a limited degree be dealt with in this way.

Concerns about the impact of agriculture on animal welfare and the environment are often presented as peculiar to Europe. These concerns are undoubtedly shared by many around the world, but it is correct to say that they have a greater influence on legislation in Europe than in most other countries; and this means that enterprises based in Europe act under legal regulation that may make European production more costly. Global competitiveness is therefore a key issue. Ideally speaking, it could be as suggested by Lawrence et al. (2004) to address the cost question by incorporating non-economic values in the breeding index, and to work on the assumption that any additional monetary

costs are considered part of the public good and paid for as such. However, such mechanisms are not in place.

5.3 Reflecting stakeholder concerns in the breeding goals

Breeding companies play an essential role in developing livestock production of a kind that respects animals, the environment and consumer safety, because breeding decisions critically decide what kinds of animal will be used in farm animal production. On the other hand, the breeders' room for manoeuvre in response to ethical demands may be small, since breeders are just one link in the food production chain. Although they work (and must work) within economic parameters, breeders need ideally to consider all stakeholders' concerns, and to ensure that they are transparent about which considerations are included or reflected in their breeding goals (Gamborg and Sandøe, *in press*).

The situation outlined here clearly shows that if sustainability is a serious European aspiration, it will be necessary to create an appropriate economic framework to safeguard the future of a European agriculture going beyond short-term economic profit.

6. Conclusions and recommendations

Many ethical concerns do appear as relevant to modern farm animal breeding and reproduction: animal welfare, animal health, genetic diversity, productivity, environmental protection, and so on. Different stakeholders including industry, consumer organisations, and animal welfare groups put emphasis on different concerns. The lessons from the SEFABAR project were that the important questions to face are what the breeders in fact consider to be relevant concerns in relation to aiming at more sustainable practices, what they consider the most important ones, how they would handle conflicting concerns and how they would translate the concerns into more tangible criteria and indicators, and ultimately breeding goals and practices?

Breeders have identified with no great difficulty what concerns they consider most relevant and most important to their species groups. It is these key concerns that the Code addresses. A challenge, though, is still to prioritise potentially conflicting concerns. Roughly two ways exist to overcome conflicts of concerns: By technological accomplishments, leading to changes in breeding practices, or through increased transparency, leading to clearer statements of relative priorities. The code of good practice can help to point to which of these ways different problems have been, or are likely to be handled. Especially when it comes to clearer statements of relative priorities the Code should stand a good chance of assisting breeders.

6.1 Possibilities and limitations

It is important, however, to adjust expectations to realities in dealing with ethical issues through adopting a code of good practice (Olsson et al., 2004). The key *benefits* of handling ethical concerns about farm animal breeding and reproduction through a code of good practice include raised public awareness, the prospect of enhanced international impact, and the ability to affect legislation. The key *limitations* of such a code are connected with problems of public accountability, the fact that breeding is just one part of the whole chain of food, and the need for re-evaluation.

Some of the key *possibilities* with a Code to handle ethical elements of farm animal breeding and reproduction are:

- Awareness. The Code can be a step in raising further awareness about ethical aspects to include in breeding practices.
- International impact. The Code can be likely to have some international impact, at least in a European context, as it is to be adopted by European operating breeding companies.
- Attention. The Code may add focus to the breeding and reproduction part of the agricultural food chain.
- Legislation. The Code may pave the way for changes in legislation and ways to improve implementation and enforcement of legislation

Some of the key *limitations* to such a Code are:

- Public accountability. The Code in itself is not necessarily enough to fully address the ethical elements. There is also a need to address and understand stakeholder (e.g. consumer) opinions and to ensure public dialogue.
- Chain of food. Breeding and reproduction is only one part of the food chain, and as such addresses only a small part of the ethical aspects of livestock.
- Re-evaluation. There will never be a final version of the Code but it will have to be subject to periodic re-evaluations(dependent upon scheme and formal status) to ensure correctness and relevance.
- Pretext for doing nothing. It should be avoided that the Code becomes a pretext for doing nothing else. It should be used as a starting point for discussion and as a way to initiate other, more concrete actions within farm animal breeding and reproduction.
- Impact of Code – Certification. The question remains open whether the Code will result in actual certification of breeding companies adopting the Code, to which extent such certification will take place, the requirements are of major importance for the impact of the Code.

For the companies concerned, it is vital that breeding is acknowledged as an economic activity pursued in a market. Just how much consideration can be given to a trait or ethical concern will depend on the economic circumstances.

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