

SUSTAINABLE FARM ANIMAL BREEDING AND REPRODUCTION IN EUROPE

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INTRODUCTION

This paper describes the first year results of the “Sustainable European Farm Animal Breeding and Reproduction” (SEFABAR) project. SEFABAR was initiated by the Farm Animal Industrial Platform (FAIP) to respond to the growing public concern in Europe on farm animal breeding and reproduction. Farm animal breeding and reproduction industry is on the threshold of the application of new biotechnologies. Genomics and other new opportunities are promising, but their application needs to be considered in the society concept as well. Next to the new technologies, the traditional breeding and reproduction technologies also raise questions in society in a number of instances.

The aim of SEFABAR is to enhance a better mutual understanding between farm animal breeders and society, so that breeding goals and methods in the future can better be based on consumer demands and society acceptance. In the first year of the project, the aim was to establish a network of over 40 industry and research managers (“members”) to make well-discussed definitions of sustainable breeding and reproduction for ruminants (milk and meat), pigs, poultry (eggs and meat) and aquaculture, an overview of ongoing research and business efforts with regard to sustainable breeding and reproduction, and to define knowledge gaps and options for future changes in breeding and reproduction. This information will be used in the second year as background information for several socio-economic case studies, and to develop sustainable breeding scenarios in the different species. In the third year the results of the socio-economic case studies and breeding scenarios will be integrated to come up with sustainable, society accepted and economically sound breeding scenarios for ruminants, pigs, poultry and fish, and a broad overview of sustainable breeding possibilities for farm animals as a whole

MATERIAL AND METHODS

SEFABAR network. SEFABAR is an EU funded Thematic Network of breeding scientists, industry and socio-economic scientists. The network Management Group includes representatives from FAIP, European Association for Animal Production (EAAP), European Aquaculture Society (EAS) and World’s Poultry Science Association (WPSA). The socio-economic partners are Centre for Bio-ethics and Risk Assessment, Denmark (bio-ethics), Akademie für Tierschutz, Germany (animal welfare), Agricultural Economics Unit, University of Exeter, UK (economic and world trade aspects), INRA CORELA, France (public

opinion), and Rural Sociology, Wageningen University, The Netherlands (cultural differences). The SEFABAR project started in December 2000 and will take three years.

Methods. The animal breeders and scientists, equally divided between species and between industry and research, cooperated in the first year of SEFABAR in working parties per group of species: ruminants, pigs, poultry and aquaculture. The discussions were started in a joint meeting of SEFABAR in April 2001, and continued in e-mail communities per species and in further workshops. Based on the discussions, the groups prepared for each species a report containing an introduction to the history and current state of the art in breeding/reproduction, key traits and trends, an overview of ongoing research and business efforts, knowledge gaps, and options for sustainable breeding and reproduction in the future, with comments and input from the socio-economic partners. This original report is used for internal reference in the later stages of the project. The main results have also been published for the general audience in a separate booklet (SEFABAR, 2002). The network website with information on the project is at www.sefabar.org.

RESULTS AND DISCUSSION

Definitions of sustainable farm animal breeding and reproduction. As the nature and uses of the farm animal species included in the project are very wide, the specific criteria of what aspects should be included in sustainable breeding and reproduction differ somewhat between the species. The commonly used criteria for all species are presented in Table 1.

Table 1. Common criteria for sustainable animal breeding and reproduction in the European farm animal species.

Criteria	Definition
Quality	Improving product quality, health and welfare of animals, and food safety for consumers
Diversity	Maintaining biodiversity, improving adaptability to diverse environments, improving product diversification
Acceptability	Fulfilling ethical and animal welfare standards of production
Environment	Minimising pollution, improving efficiency of feed resource and land utilisation
Economics	Improving production efficiency and economic viability, both short and long term

Species differ in production circumstances and the period they have been subjected to organised breeding. Furthermore, some contradictory criteria, e.g. production and fitness related traits that compete from the same limited resources within the animal, are difficult to take into account at the same time. Therefore, the above criteria are not equally important for all species, although they are largely similar for the 'land animals' with most emphasis on maintenance of genetic diversity, robustness in a wide range of environmental conditions,

disease resistance and other animal health and welfare issues, efficient use of natural (feed and land) resources, and optimised product quality for different markets. In the aquaculture species the main priorities are minimisation of the environmental impact (especially escapes and possible interbreeding of domesticated and wild animals), maintenance of animal integrity with normal physiological functions, and the improved use of sustainable feed resources for the mostly carnivorous farmed aquaculture species.

Ongoing research and business efforts. The definition(s) of sustainable animal breeding and reproduction for the major European farm animal species are so many-sided that currently there is hardly any breeding related work that is not relevant to the sustainability in breeding and/or reproduction. However, while there is a lot of research related to one or a few of the separate components of the sustainability criteria in farm animal breeding and reproduction, meta-level studies that explicitly analyse questions such as ‘what is sustainable breeding and/or reproduction’, ‘what are the main components’, and ‘what is the potential impact on breeding programmes’, are still scarce (e.g., Boer *et al.*, 1995; EC-ELSA, 1999; Kanis, 1993; Olesen *et al.*, 2000; Sandøe *et al.*, 1998; Sandøe *et al.*, 1999; Torp-Donner and Juga, 1997).

In general, there is a tendency to shift emphasis from increasing the quantity of production to improving the efficiency of production. Society concerns about animal welfare, ethics and product quality are beginning to show in the industry involvement in animal breeding as well: for example, breeding organisations include animal health and welfare related traits into their breeding strategies. In some cases, separate ‘alternative’ breeding lines have been developed in addition to the standard breeding stock (e.g., Label Rouge poultry).

Options for sustainable farm animal breeding in the future. An important aspect for sustainable breeding and reproduction involves the redefinition of breeding goals into a wider perspective in a) producing animals with a (long) economical productive life without giving signs of disturbed welfare in specific environments, and b) optimising input/output and feed efficiency with sustainable feed resources. However, before technologies to select animals can be extended to new traits, good selection criteria - what concrete measure to select for - have to be defined. Good monitoring programmes need to be implemented in order to see undesired effects of selection at an early stage. Such schemes need to cover a wide range of production environments to be able to select animals that perform well in a wide range of production circumstances and also to select animals better adapted to specific farming environments. Methods need to be utilised to restrict level of inbreeding to maintain genetic diversity in the farm animal populations under selection. Industry should make their production as transparent and traceable as possible, and aim at an open dialogue, based on facts, between producers and consumers. Many of the dilemmas can be tackled by improving communication within the production chain.

Knowledge and/or implementation gaps. Information is still scarce on issues such as the genetic basis of disease resistance and welfare, genetic aspects of robustness, the capacity of

adaptation of animals, how to balance system inputs and outputs for sustainable use of resources (protein, energy) and how to incorporate these aspects into breeding programmes. Methods for measuring welfare and psychological health of animals, knowledge on individual nutrient requirements for specific genotypes, and adequate parameters to measure disease resistance, are also required. Reliable data on the trends in the European breeding industry in terms of productivity, efficiency, and welfare-related and environmental criteria are not yet available in most cases.

For biodiversity, methods for storage of “complete” genotypes in gene banks, and methods to measure and describe the stored phenotypes are needed. The question of who should be responsible for gene banks needs to be solved.

In general there is a lack of understanding of consumers and how to communicate with them. Public acceptance of the use of certain feed resources (human food waste), the production of sterile fish (to prevent environmental contamination of wild populations), and consumer perception of new breeding and reproduction technologies, e.g. hormonally induced reproduction, are unknown.

CONCLUSION

The European farm animal breeding research and industry is currently already working on numerous aspects related to the sustainability criteria of quality, diversity, acceptability, environment and economics. However, animal breeders realise that they need to improve their interaction with the society around them, and there is still a lack of studies that discuss what elements should be included in “sustainable farm animal breeding” in the first place. The SEFABAR project, in which a great number of European farm animal breeders participate together with the socio-economists, aims to address both of these aspects.

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