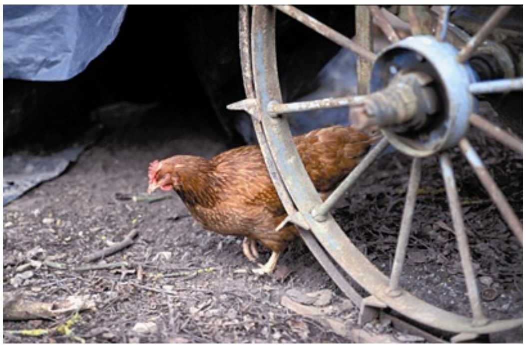
Developing Agrobiodiversity!

Strategies for action and impulses for sustainable animal and plant breeding



Position Paper

for Sustainable Plant and Animal Breeding

Cooperative Project “Developing Agrobiodiversity”

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1 Agrobiodiversity reflects diverse societal use.

‚Biodiversity', translated as the diversity of living things, encompasses the entire variety of life forms in the agricultural sphere. Agrobiodiversity ranges from the breeding to the keeping of animals and the culturing of plants (with associated flora and fauna), and includes the diversity of plants and animals in processing and marketing, in food and in other forms of end use products.

As is the case with so called ‚wild' biodiversity, agrobiodiversity is composed of an intertwined system of many levels: It encompasses the diversity of different species, diversity within the species used through differences between varieties and breeds, diversity within varieties or breeds themselves through different subpopulations, differing individual gene combinations and the allele variety of individual genes. All this diversity came into existence and is conserved under the protection of and in exchange with the diversity of ecosystems. In the case of man-made agricultural diversity, the system is a socio(bio)tope: without breeders and users none of these animal breeds or plant varieties would exist. The diversity of farm animals and crop plants is the product of agricultural activity in a variety of environmental conditions, production systems and cultures. The various species, varieties, breeds and local populations were not accidentally created, but in symbiosis between humans and cultivated species over thousands of unrepeatable years of breeding – and are even today not obviously ‚dispensable'. With their diversity and variability they have made possible and continue to make possible the production of food and other agricultural products, the survival of humans in different agricultural ecosystems (soil, climate, water and fodder availability) and food cultures which have developed with them. Each was specifically adapted and so heterogeneous and variable in its nature that they were able to overcome both seasonal and considerable other forms of variation.

The term Agro*bio*diversity implies: If agrobiodiversity is not *lived* then it does not exist. That which is not processed, purchased, consumed or used in another way, does not contribute to the diversity of crop plants and farm animals and is ultimately threatened with extinction. The concept of habitat protection has established itself in the discussion regarding the protection of 'wild' biodiversity. To protect a specific Tiger species, not only the Tiger itself, but its environs or habitat, such as the appropriate rainforest type, is protected, therewith protecting in a much wider reaching manner the network of diversity required to protect the tiger. The habitat of farm animals and crop plants, their rainforest, is above all the farmers themselves in their social and economic relationships with one another and in their relations to the environment, which shapes the 'natural' location.

2 Agrobiodiversity is a common good.

The breeding of farm animals and cultivars was carried out for many years by local farming communities in a cooperative manner. The benefits of diversity were not available to individual breeders alone but to the entire group. Each generation built and still builds on the advances of previous generations, using regionally and historically varying methods which in turn are embedded in different 'life-worlds'. In the process, many plants and animals were introduced from spots of biodiversity outside Europe. Agricultural biodiversity is, thus, the result of international exchange (to a degree also colonial appropriation) and collective effort. The result is also a common good, the preservation of which is in everybody's interest – not only plant and animal breeding companies, gardeners and farmers rely on agrobiodiversity for their existence, all humankind does: Agrobiodiversity is one of the fundamental elements in securing the food supply.

Thus, managing the collective inheritance of agrobiodiversity in a conscientious manner is necessary: Based on the polluter-pays-principle, those who use genetic resources in their business, who gain profits from and hinder the access of others to them (e.g. through intellectual property rights), also bear the responsibility of preserving them. This applies not only to breeding, farming, processing and retail, but also to the state, which creates the political and legal framework for management. The state should, among other things, ensure that social and political actors are involved in the shaping of policies regarding agrobiodiversity.

3 Agrobiodiversity is disappearing.

The loss of agrobiodiversity is an insidious problem: Stalls, paddocks and fields have become increasingly monotonous over the past few decades.

In this way the spectrum of cultivated plants in use has shrunk considerably. The majority of the world food supply is now based on only 10 cultivated plant species. The overwhelming majority of crop species (99.6%) remain 'underutilised' in comparison. It is estimated that the plant genetic resources (PGR) presently being actively cultivated represent only 25% of the worldwide diversity which was in use at the beginning of the 20th Century.

While in the Global South a great deal more plant genetic diversity is still available *on farm*, in industrialised countries such as Germany, traditional varieties are hardly sown at all. Estimates of genetic erosion in Germany are even higher than 90%. Low variability in crop rotation and ever more standardised management practices are associated with these trends.

The situation is similar for farm animals: Over the last 100 years, 1000 of the 6400 recognised livestock breeds have become extinct worldwide. The FAO warns that a further 2000 highly threatened breeds may die out and brings attention to the fact that two breeds are being lost on average per week. Approximately half of the breeds present in Europe at the beginning of the 20th Century have disappeared forever; one third of the remaining 770 is highly endangered. In Germany, of at least 35 original cattle breeds only 5 remain. The everyday use of almost all species is dominated by very few breeds: Worldwide the Holstein Friesian has become the synonym for 'cow'. Within this breed itself, a small number of 'Top-Breeders' dominate: An individual bull can father up to 1 million calves. 66% of the mothers of European fattening pigs are crosses of the 'Large White' and 'Landrace' breeds. Only three companies supply the entire world with hens, all of which can be traced back to the same breed, the Leghorn.

To this day the political discussion regarding the loss of agrobiodiversity occurs predominantly at the international level. Among others, the problem is discussed within the FAO, the Convention on Biological Diversity and the OECD where analytical foundations are being set down. In Germany the discussion is predominantly carried out at the institutional, administrative level, in the context of implementing international commitments. The most important results are the German Federal Programmes for Plant and Animal Genetic Resources. The debate has yet to find greater resonance within agricultural and breeding practices.

4 Loss of Agrobiodiversity has serious consequences.

The loss of agrobiodiversity is already causing concrete problems and harbours further risks for the future.

Agrobiodiversity is one of the fundamental factors in securing the world food supply. For many individuals, particularly those in subsistence or semi-subsistence farming, this diversity, along with access to water and fertile soil are the basis of their existence. Besides its direct value in supplying food, as well as for livelihoods, habitats and ecosystems, diversity in agriculture lowers certain production risks and is still today a form of insurance against poor harvests and susceptibility to pests and illnesses. Thus, decreased species diversity, breed diversity and genetic diversity in stalls, paddocks and fields leads to increased susceptibility to microorganisms. These pests also exhibit an increased rate of reproduction and, as a result, an increased rate of mutation per unit of time. In the case of standardised animal or plant populations, there is the chance that large numbers or areas can be quickly infected by such a mutation. One famous example of disease susceptibility due to low genetic diversity is Ireland's potato blight of 1845. As (only) three varieties of potato were farmed in large area monocultures, the disease was able to spread quickly, resulting in the starvation or migration of three million people. Insufficient genetic diversity of cultivated (hybrid) corn in the United States led to outbreaks of the fungal disease *'Southern Corn Leaf Blight'* in 1970 destroying 15%, in some areas up to 50%, of the US corn harvest, causing economic damages of more than one billion US dollars.

In addition, animals which have not been bred to invest all their available energy into high performance with regard to one specific characteristic have more energy reserves to maintain a functioning immune system. They are more resistant to infections and pests. For example, high performance dairy cows are often very susceptible to disease, among others to udder infections (mastitis).

A further danger occurs in animal breeding due to the focus on a few 'Top-Breeders', some of which are, in addition, more closely related to each other than normal. This strategy can be used to achieve rapid increases in breed quality, but exposes the population over the long-term to inbreeding depression, i.e. to a potential loss of vitality, fertility and performance.

Using or applying a small number of genotypes also harbours the risk of spreading recessive genes responsible for undesirable characteristics in an unrecognised, incidental manner. This is only recognised when the frequency of the specific allele is so high in the population that an increasing number of homozygous 'negative' carriers occur. In this way, the Bovine Leukocyte Adhesion Deficiency (BLAD) present in German Schwarzbunt cattle was first noticed in the 1990's, yet was traced back to a bull born in

1952. A well known example among pigs is the high incidence of the MHS gene in Pietrain breeding, which together with excessive muscle size, is responsible for neck muscle necrosis and decreased meat quality.

Standardisation in plant cultivation and animal husbandry, allowing the worldwide success of individual genotypes, not only increases production risks in agriculture, it also often leads to high consumption of fossil energy, fertiliser and plant pesticides, high energy supplement fodder, antibiotics, and intensive technology input. These high inputs are ecologically unsound and not sustainable due to limited natural resources. Already, there are not sufficient breeds and varieties worldwide to ensure sustainable, regionally adapted agriculture. There are, for example, no chicken breeds suited to free-range farming in Germany, there is no marketable 'eco-pig' and only one grape variety suited to sandy soils. The economic advantages and the need for adapted plants and animals become even clearer in the example of the so-called developing countries: Under conditions of climatic extremes and variations in availability of resources, intensive farming can often suffer slumps in performance, while extensive land use with adapted varieties and local multi-use breeds produces more stable and often higher yields. Breeding with the goal of highest yield is often contrary to an orientation towards security of harvest.

Last but not least, the diversity of cultivated plants and domesticated animals created by humans is a cultural heritage. The extinction of plants and animals and the loss of first hand knowledge about their use mean a cultural loss for current and future generations – with serious ecological and economic implications.

Ultimately, options for future breeding activity disappear with the loss of genetic diversity within breeds or varieties, with the extinction of each specific breed or variety, or even with their preservation exclusively ex-situ in gene banks. That makes the adaptation to unforeseeable disease risks, to changing environmental conditions such as climate change or to new knowledge regarding nutritional requirements more difficult, therewith further hampering future diversification in agricultural land use.

The preservation of genetic resources in gene banks, cryo-conservation, zoos or on show farms is presently necessary to avoid the permanent loss of breeds, varieties and genetic diversity. This approach at least ensures that the reintroduction of 'underutilised' genotypes remains physically possible. This allows the reestablishment of diversity in everyday production, yet does not replace it: The risks associated with lacking agrobiodiversity in agriculture can not be counteracted by *ex situ* preservation. Active use of a large number of diverse breeds, lines and varieties in agriculture is necessary to ensure against these risks. The continued dynamic development of animals and plants in adaptation to their surrounding ecosystems and the commensurate growth of first hand knowledge and food cultures require their active use in agriculture, i.e. on farm, along with the protection of the areas of origin of cultivated plants.

Obstacles to achieving more Agrobiodiversity

5 The multifunctionality of agriculture is being neglected.

The mode of agricultural production in industrial countries has changed comprehensively during the last 150 years. Agriculture was initially linked to environmental conditions to a large degree, and thus strongly dependent on natural local factors. In current European agriculture, local factors and methods of production have become overwhelmingly separated from one another. This separation was achieved through scientific advances, above all through the products of the chemical industry such as fertilisers and pesticides, and through the use of fossil fuels; further supported by agricultural policies heavily influenced by times of food shortages, these factors encouraged 'high-performance' agriculture. This form of agriculture is recognisable by its short-term focus on yield, whereby the amount of inputs is not taken into account. At the same time, agriculture's position also changed, moving from a relatively self-sufficient system to become a link within a production line, in which farmers only control a small part of the added value. Agricultural products increasingly became the raw materials of the food industry.

A negative factor accompanying this process is the loss of agriculture's original multifunctional nature: Positive side-effects and services such as landscape conservation, increases in soil fertility and conservation of biodiversity are not carried out sufficiently. In place of the positive examples given above, agriculture now increasingly creates and contributes to negative external effects such as erosion of fertile soils, eutrophication and nitrogen emissions. In the process, the conditions which made increased agricultural productivity necessary in Europe have changed, now excesses of production, not shortages, shape the issue.

6 The problem is interpreted differently and public awareness is lacking.

The problem of disappearing agricultural biodiversity has been discussed for some time within expert circles. Discussions do not always produce agreement on the perception of the problem: Despite pertinent studies, a number of scientists and breeding professionals view current agrobiodiversity as sufficient and see the risk of loss as not serious or as easily solved through the application of new technologies. This assessment of the situation is linked, among other things, to an awareness of the success of previous breeding efforts in increasing performance, which could be 'devalued' by a paradigm shift on the issue.

Overall, the discussion of the loss of agricultural diversity in species and genetic characteristics is well developed at the expert level. Still, the discussion does exhibit some gaps: There is, for example, so far very little debate on the variety of management and production methods, which are closely linked to agrobiodiversity. Yet the greatest challenge lies in the fact that the problem is hardly known outside expert circles. Even many farmers are hardly aware of the subject of shrinking agrobiodiversity, as it is not part of their training and, despite individual initiatives, has not received enough publicity. At the same time, the debate regarding biological diversity focuses primarily on 'wild' biodiversity.

Social awareness of a problem is one of the key starting points for change. A comprehensive discussion, involving all parties both inside and outside expert and academic circles, regarding the extent and dangers of agrobiodiversity loss and the possibilities available to limit it, is thus of considerable importance. The same is true of wide-reaching public awareness and education programmes.

7 (Bio-) Technology developments can endanger Agrobiodiversity.

Developments in the area of modern biotechnology have contributed to the loss of agrobiodiversity. They allow faster selection and distribution of chosen genotypes and the production of a number of breeds, lines and races focussed on specific characteristics and highly homogenised, as demanded by industrialised agriculture. This concentration on limited genetic material conceals the risk of susceptibility due to homogeneity, along with further risks such as the unnoticed accumulation of undesirable hereditary traits. Commensurately, this process hinders the proliferation of non-selected genotypes, displaces locally and regionally suited breeds and races and promotes, thus, allele loss and genetic homogeneity within a few, widely spread breeds, races and lines. Their distribution is further favoured by the compulsion towards recompense of comparatively high breed development costs. The increased cost pressure leads to the predominance of fewer, larger providers and, thus, indirectly to further limiting of the range of breeds and lines. Ultimately biotechnological methods allow the manipulation of living material which is partly able to be protected under the current interpretation of European patent law. Mainly in the case of genetically modified organisms even living matter can be patented. This can raise costs and can limit access to breeding materials, until now predominantly in plant breeding activities.

The possibilities for manipulation of animal genomes are less widely advanced than those of plants. In the case of cattle, pigs and poultry, above all artificial insemination and incubation allow natural limitations of reproduction rates to be exceeded. The selection of those individuals, which promise the most breeding advancement, has been accelerated through the development of data processing and refined estimation of breeding values. The latter, though, have the tendency to select ever more closely related animals. Yet, the danger of the appearance of characteristic antagonisms and the accumulation of undesirable gene sequences within a population rises with the concentration on desired animals and gene sequences. The application of selective gene tests for these sequences as well as marker supported preferential selection of gene sequences, which promise higher performance, can further reduce the (overall) genetic basis. Fundamentally it must be kept in mind that the improved diagnosis and recognition of genetic aberrations leads to increased willingness to take risks, in the assumption that the opportunity to identify mistakes more rapidly will make damage limitation simpler.

Newer (bio-) technologies can also be applied – within limits – to 'repair' the very damages they have indirectly caused. Estimations of breeding values allow increased inbreeding to be negatively rated and thus be reduced. The technical capacity to manage growing amounts of data can be used, among other things, to attempt to fulfil more complex breeding goals. Gene banks for cultivated plants and cryo-conservation of animal sperm help to maintain the possibility of reintroduction of no longer used genotypes.

8 Production and retail have a standardising effect.

In European agriculture, the upstream and downstream areas of agricultural production have constantly grown in economic importance. Agriculture is increasingly organised using division of labour and must subordinate itself to a large degree to the business rationalities of agribusiness. Size advantages in production (economies of scale) create the demand for large amounts of homogenous, price-worthy agricultural primary products. The system of graded products and industrial quality standards is a further expression of the process of homogenisation. Within agriculture, this pressure to conform leads to concentration on the most lucrative commodity and also to standardisation of products and methods of production. Finally, the spectrum of production is narrowed by the increased concentration of both retail and food processing industries, as the purchasing is controlled by a small number of companies.

Agriculture has been integrated into a production and innovation system based on the logic of industrial production. The capacity of agriculture and also the upstream and downstream areas of agricultural production to work with diversity, to use diversity, and so preserve it as a living entity, is thus now limited. Equally limited is the power of consumers to work towards more agrobiodiversity because the range offered is structured to a greater degree by the demands of industrial processing rather than by consumer demand.

9 Existing law can hinder Agrobiodiversity.

Existing law does not promote agrobiological diversity. Often it strengthens the orientation of animal and plant breeding towards one-dimensional breeding goals, towards homogeneity and high yield or performance in a single, generally quantitatively measurable, characteristic. On the other hand, breeding goals which had no recognisable short-term economic relevance were neglected. These can include complex abilities such as general resilience and high animal life performance, but also taste, nutritional value and vitamin content.

In plant breeding, according to the German *'Saatgutverkehrsgesetz'* (Seed Trading Law), a so called Value for Cultivation and Use (VCU) must be proven for new agricultural breeds before they can be distributed. A variety has such a VCU when it exhibits a distinct improvement in the sum of assessed characteristics in comparison to other approved comparable breeds. The assessed value characteristics, as defined by the state, are not only oriented towards high-yields, they also outline specific, narrowly defined breeding goals. In the registration, a special analysis of traits deviating from the defined goals is subject to additional costs. Also the criteria of homogeneity and stability for variety registration and variety protection promote the standardisation of plant breeding products. Increasingly rigid intellectual property rights, above all patents, make access to plant varieties and animal breeds for breeding purposes more difficult.

Further standardisation of agricultural products is brought about by legal goods grading in addition to price guarantees within the framework of EU policies, which promote high yielding varieties over rare or regionally suited breeds. Until now, it has not been an equivalent policy goal to promote more diversity alongside higher yields.

Legal regimes for animal breeding have to be differentiated: specific areas, such as chicken breeding are not regulated, yet at the same time, the sum of the genetic resources in that field lies virtually in the hands of a small group of global companies. Policies regarding other farm animal species have long promoted breeding with a focus on performance and contributed to the further loss of farm animal diversity. The many years of state support for performance testing and estimation of breeding values, which was one-sidedly aimed at more (financial) yield per unit of time, ran contrary to the goal of 'genetic diversity' also set out in the Animal Breeding Law since 1989.

10 Policy instruments are lacking.

Even though genetic erosion and the loss of agrobiodiversity have been discussed amongst experts and in technical literature for some time, few, if any policy instruments exist to actively tackle the problem. Essentially, current efforts are limited to financial support to preserve plant and animal genetic resources in niches. Other instruments, ranging from binding law through market-oriented instruments and labelling to the support of cooperation between involved groups and corporate social responsibility concepts have not been used to promote agrobiodiversity. The Federal Scientific Programmes on Plant and Animal Genetic Resources open up many options, but are so far too noncommittal – also regarding the issue of financing.

Existing support programmes at the state level suffer from insufficient scope and means and could gain in impact through improved coordination. In current support practice, plant *ex-situ* preservation is given priority over *in-situ* or *on farm* approaches. Overall, passive protection dominates over support for active agricultural use linked to product processing and marketing.

The longstanding unequal treatment of conventional and ecological farming practices has meant the gambling away of chances to promote agrobiodiversity through a production approach, which attempts to take local adaptation as a basis for plant cultivation and animal husbandry. The integration of agrobiodiversity preservation into other policy areas is still in its early stages. The guiding vision of 'living diversity in agriculture', which could also form the basis of strengthened publicity work, is lacking. The decline in state engagement in areas of agriculture and research policy oriented towards public benefit is exemplified in the threatened closure of professorships in the agricultural sciences.

11 Economic rationalities obscure life-sustaining systems.

The logic of economic activity is primarily focussed on the market, and on the products and services able to be sold on the industrial marketplace. The reproductive side of (agro-) economic activity plays a neglected role within economic rationalities. This reproductive side includes the protection of important 'life-sustaining' systems such as soil fertility, water purity, and agrobiodiversity. It also includes caring for the maintenance of human labour capacity. Such aspects will only be taken into account in economic considerations when the appropriate framework for business activities is created with the help of regulation. The neglect of the reproductive dimension of economic activity is clearly indicated by the use of the constructed measure 'Gross Domestic Product' as the most important indicator of welfare: It includes only those products and services tradable on the market, yet does not take into account the unpaid reproductive activities or damages caused to the environmental basis of production.

12 Plant and animal breeding activity is not gender neutral.

Power structures within plant and animal breeding are gender linked: even though gender differentiated statistics of the full life-cycle of agricultural products are lacking, it can be said that more men have decision making power than women in plant and animal breeding activities.

Men are in the majority at the management level of breeding institutions, in professorial positions for animal and plant breeding, as well as on executive boards of the food industry responsible for most of the prescribed breeding goals. In ministries and within international institutions women have somewhat better career opportunities. With the exception of highly intensive farming operations, women are comparatively over-represented in the everyday activities of animal care and in direct physical contact with cultivated plants, hence, with the products of plant and animal breeding. The consequential low involvement of men becomes more evident with regard to the consumption of agricultural end products: Men are considerably less involved with the dilemma of responsible purchase decisions, the everyday responsibility of family nutrition and the activities involved in fulfilling this responsibility. Women are in fact ever increasingly involved in carrying out these tasks as of late.

Gender equality is valuable in itself. What it would mean for agrobiodiversity, should women gain more structural decision making power in plant and animal breeding and if men had more chances to gain experience in everyday plant and animal husbandry, can only be answered with a well-founded assumption: Present gender socialisation influences women to take on a caring role, which could well serve the protection of diversity. Those who have experienced the requirements of daily care, which can only be fulfilled with 'diversity management', take this experience with them into for-profit businesses.

The long term perspective should be the valuing and protection of agrobiodiversity in a society without gender specific prescription and division of roles.

Approaches to the Conservation and Development of Agrobiodiversity

13 Apply the precautionary principle.

The precautionary principle is a recognised tenet of German environmental policy and is also confirmed as an operative guideline by the EU. It also lends itself well as a guideline for sustainable animal and plant breeding and for the preservation of agrobiodiversity. The precautionary principle prescribes the preventative protection of people and the environment from risks and dangers. It demands preventative action, above all, where scientific uncertainties exist and where there is concern over possibly irreversible consequences.

For the field of agrobiodiversity, a precautionary strategy means researching more intensely the driving forces, risks and costs of shrinking biodiversity, along with possibilities for its use and utilisation, and coming to agreement with all parties involved. In the breeding process, precaution means promoting a variety of breeding goals, which take into account more strongly the adaptation of the plants and animals to their location.

From the precautionary point of view, active agricultural (i.e. on farm) use and diverse application of breeds and varieties will be promoted. This presupposes both diverse agricultural activities as well as a society sensitive to the issue. Mainstreaming the issue in education, in agricultural training and amongst the general public is, thus, a further element of a precautionary strategy.

14 Strengthen the 'polluter-pays-principle'.

In shaping the future policy on agrobiodiversity it is imperative, that those parties responsible for causing societal costs in the form of loss of agrobiodiversity are being involved in solving the problem.

This applies, among others, to plant and animal breeding companies, which contribute to the loss of agrobiodiversity through their business activities: Breeding activities of the companies result in 'high performance' plants and animals, which out-compete less 'successful' plant species, varieties or animal breeds. In this way, following business management calculations, the 'common good' genetic diversity is both directly and indirectly being destroyed. Conceivable solutions to ensure the fair involvement of those causing agrobiodiversity loss could be voluntary commitments by companies to sponsor conservation measures, or a fund maintained for the preservation of agrobiodiversity, paid into by plant and animal breeding companies with a market share beyond a certain level. The societal responsibility for the problem would be accommodated if spending for agrobiodiversity was made a permanent fixture in the government budget, analogous to the annual allocation of funds for public transport. In addition, the reduction of subsidies in the area of fossil energy and therewith the internalisation of costs is conducive with the 'polluter-pays-principles' and would promote agrobiodiversity: Plant varieties, as well as animal breeds with low energy requirements (indirectly imparted through pesticide, fertilising, penning and supplement fodder needs) gain in their ability to compete. Fulfilling the demand for 'real prices', those which also take into account the external impacts, would reduce biases in resource allocation, and would contribute to more honest competition between sustainable and unsustainable agriculture. This would be associated with an increasing demand for breeding activity with rare animals and plants taking into account regional conditions.

15 Support breeding by farmers.

Participatory breeding, which is customary practice in countries of the South and which has established itself as FAO policy, is the exception in Germany's highly industrialised agriculture with its strong division of labour. Participatory breeding creates diversity because local requirements are taken into account in breeding.

For example, greater influence by farmers and their needs on the animal breeding selection process leads to better adapted animals and more diversity. Regionally adapted, and even individual farm adapted plant varieties and subpopulations of farm animals can only come into being when the individuals who work with the plants and animals can also have an influence on the breeding goals and, in the case of animals, on the selection of animals to be used in further breeding. Local adaptation and thus variety come into being through the knowledge of local requirements imparted by experienced individuals. These forms of adaptation stand no chance in an environment of standardised definitions of breeding goals for Germany or for international cultivation. The way in which the influence of users on breeding should be structured is dependent on the individual plant or animal species and must be further concretised for the agriculture of industrialised nations with its strong division of labour.

People, in worldwide reality usually women, who develop diverse, yet presently 'non-commodity', plants and animals in subsistence gardens and on small farms, must have access to genetic resources. Only in this way will they be able to ensure both their own existence and the preservation of the common good of agricultural biodiversity.

16 Farm more diversely, strengthen multifunctionality.

Agrobiodiversity requires diverse activity along the entire added value chain, from breeding to consumption. It also demands policies which strengthen multifunctionality and regionality.

More diverse breeding first of all needs a reorientation towards locally adapted plant varieties and animal breeds, but it also requires the removal of legal bottle-necks in seed trading and animal breeding laws and a decrease in breeding costs, for example through lower cultivar licensing fees and simplified animal breeding programmes. This would make participation in shaping breeding trends more profitable for more breeders and make possible a variety of (medium-sized) structures in the breeding industry.

Within agriculture, agrobiodiversity is aided through the variety of regional cultivating and animal husbandry methods and through locally adapted economic activities, as is the case primarily in ecological agriculture. In agricultural policy, approaches for regionalisation and ecological adjustment are to be strengthened. The concept of multifunctional agriculture must be the operative guideline: It views agricultural methods of production in a systemic way and assumes that agriculture, whilst producing food and other raw materials for industry, also performs or should perform other social and ecological functions.

An internalisation of these external benefits in the case of agrobiodiversity is conceivable, among other things, through expanded institutional support of conservation initiatives and production support. They need to be consolidated and combined with new policy instruments.

Ultimately, to fully develop the multifunctionality of agriculture, more diversity must be aimed for in the development of rural areas and regional tourism concepts. Awareness-building for agrobiodiversity as a valuable entity is to be integrated into this process, for example within the framework of farm visits or product tasting.

The significant challenge regarding the processing industry and retail sector lies in stimulating demand for increased animal and plant diversity – in spite of the economic advantages of larger, more homogenous batches. Cooperation along the entire food production chain, for example between companies and conservation initiatives, can promote this demand. In addition, the development of new forms of use or the revitalisation of older forms of use of under-utilised animal and plant genetic resources as producers of raw materials supports their return to everyday use. Along with the development of new products and appropriate marketing initiatives aimed at consumers, the creation of distribution channels is essential. More diversity in retail and processing requires a return to a diverse nutritional culture, in which regional specialities from several different animal breeds and plant varieties are enjoyed.

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Strategies for action and impulses for sustainable animal and plant breeding

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