

Recommendation by the German Advisory Board on Animal Genetic Resources

Status, Problems and the Actions Needed on Conservation-Breeding Programmes for Indigenous Farm-Animal Breeds Threatened by Extinction

Introduction

Unlike a breeding programme directed at genetic improvement and economic viability, a conservation-breeding programme for livestock breeds is primarily aimed at retaining a breed's genetic variability and the characteristics typical for its breed.

Conservation-breeding programmes serve as core constituent parts of national and international strategies aimed at conserving animal genetic resources and, in particular, at conserving breeds under threat of extinction (FAO (2007)). Accordingly, the National Programme for Conservation and Sustainable Use of Animal Genetic Resources in Germany (2003) provides for each breed to have a conservation-breeding programme set up for it, as soon as its risk category reaches the level of a 'conservation breed'.

For structuring and implementing conservation-breeding programmes in subject-specialist terms, specialist committees from the German Society for Animal Production (*DGfZ*) have repeatedly taken up policy positions (*DGfZ (1979)*, *DGfZ (1992)*). In addition, the Society has conducted a status review on conservation-breeding programmes in 12 German *Länder* (states), also proposing specific recommendations to improve the individual programmes (*DGfZ (1995 to 1999)*).

After these recommendations, the National Programme was officially introduced by the Federal Government and by the *Länder* (states), and by now more comprehensive funding measures are being put into place for animal-keepers; nonetheless it must be concluded that practical implementation of the conservation-breeding programmes in Germany is (at least in part) characterised by substantial shortcomings.

This Policy Position directs attention to these problems and the areas where action is needed. In particular, recommendations are given, ranging from the structuring of the organisational framework, right through to measures of funding for conservation-breeding programmes.

Explicitly, the Advisory Board concludes that it is only possible to implement these recommendations for conducting conservation-breeding programmes suitable to the purpose if this is supported by suitably structured public funding.

1. Necessary elements of a conservation-breeding programme

1.1 Breeding: goals, planning and management

Each conservation-breeding programme must be implemented on the basis of clear, written descriptions accompanied by management of the breeding activity that has both appropriate specialist expertise and authority to act.

The description of a breeding programme must include at least three blocks in terms of content:

- 1. Definition of the breeding goals. This involves stating the desired effects of the breeding programme on the animals' characteristics and also on genetic variance; the starting point must be to characterise the currently-existing population, and to take into account the original direction taken**

in breeding and in animal use, In this context, the breeding goal can also provide grounds for an adaptation of the original breeding goal.

- 2. Definition of the breeding measures envisaged for this purpose, especially the planning for pairing of animal couples and deployment of father animals, checks made on output, selection.**
- 3. Determination of procedures and criteria, on the basis of which, in regular cycles, the results attained in the breeding programme are compared with the goals defined under 1. (above) and, where applicable, appropriate adaptations are made to the breeding measures, or even to the breeding goals.**

In practice, breeding goals often include only verbal descriptions of desired outcomes or attribute values. Also, information on the breeding programme is frequently rather unspecific; the result is that only in rare instances is there a regular check on whether the goals pursued are being attained through the breeding measures applied. Frequently the breeder associations have not finalised decisions or set any rules that authorise the breeding-process managers to put into effect specific measures, or which can oblige the breeders to participate in measures that span across individual businesses.

1.2 Conservation of genetic variance, planning the pairing of animals

A necessary and highest-level goal for any conservation-breeding programme is to safeguard genetic variance. Consistent with this, each conservation-breeding programme must produce specific information on the target maximum level of annual growth in inbreeding and the corresponding measures applied.

- The target maximum level of growth of inbreeding does not lend itself to being prescribed as a 'one-solution-fits-all' figure; instead, the breeder organisation must deduce it from the breeding population's particular conditions and justify it.**
- If substantive funding is granted for a conservation-breeding programme, a suitable procedure for assessing the population data must provide proof, at intervals not exceeding three years, showing the level of inbreeding that is in fact taking place.**
- A key element in sustainably limiting the increase of inbreeding is for a sufficient number of father families to be maintained and for the males to be put into use at as equal a level of frequency as is possible.**
- Use of artificial insemination is also an effective instrument; it can be structured even more effectively by using available stocks from the gene bank or from animal insemination stations.**

Although conservation-breeding programmes are primarily aimed at avoidance of further losses of alleles, the annual growth of inbreeding is a widespread and suitable criterion applied to the development of genetic variance. In practical situations, losses of alleles and growth of inbreeding take a course of development that is in proportion to one another.

At present, in terms of monitoring inbreeding, many conservation-breeding programmes rely solely on the effectiveness of pairing programmes; however, used in isolation such programmes cannot be other than ineffective over the medium term. The deployment of father animals spanning across different farming enterprises (by means of rotation, for instance) is laborious in organisational terms and is not much in use. Similarly, and particularly among conservation breeds, artificial insemination is not applied in many instances; in Germany, it is practically not used at all among sheep and goats. The

process of making avail of the gene bank's semen stocks, on a planned and regular basis, to optimise the variation in conservation-breed programmes, is something still yet to be developed in Germany.

1.3 Pure breeding; crossing

Conservation-breeding programmes usually aim at maintaining certain breeds' genetic structure. Thus, on principle, pure breeding must be applied as strictly as possible.

- **Crossings are irreversible and can put into question the higher-level goal, namely breed conservation. They must therefore be restricted to situations in which it is no longer purposeful to maintain a population in pure breeding. If conservation-breeding programmes obtain public funding, each intended crossing certainly should be coordinated with the public body that provides the funding.**
- **If a crossing becomes necessary, if possible the external breed must be selected according to objective, phylogenetic criteria.**
- **In instances where subpopulations are present, the use of breeding animals from subpopulations must take priority over the crossing of other breeds into individual subpopulations.**

Frequently, crossings are introduced without prior careful deliberation, formal passing of decisions by the breeder organisations, or indeed endorsement by the state-run authorities that award such organisations' recognition; this is because such crossings are seen as a simple means of counteracting a growth in inbreeding or to attain an improvement in that breed (e.g. shape of udder, milk output).

In this context, it is mostly the dangers of increasing the inbreeding that are overestimated, while the disadvantageous consequences of crossing are overlooked. In addition, the external breeds are often chosen on a superficial basis, according to similarity of the phenotype.

1.4 Selection and checking of performance

Due to the priority goal of conserving genetic variation, as a general principle an intensive selection is prohibited.

- **Nonetheless a selection is purposeful and must be applied in such a way that a breed's original characteristics of use are at least maintained, but the variation in other characteristics is not restricted. The intensity level of the selection measures must be adapted to the targeted level of increase in inbreeding, according to Item 1.2. (above).**
- **In order to improve the chance of a breed being used, or also merely to reduce the costs of conserving a given breed under that breed's typical conditions of use, the following applies: wherever possible, breeding should be used to improve the characteristics that are significant to maintaining the animals under conditions of use typical to that breed.**
- **Performance checks are purposeful in this context, even if this is solely to observe intended and unintended changes to the breed's essential characteristics.**

It may be that performance monitoring, according to the original designated use, e.g. for milk or for meat, can still be maintained only among a part of the population; it may be that the other part of the population operates solely with a

restricted designated use. For as long as this is so, the population should continue to be maintained as one breed; this requires separate sections to be set up in the herd-book, according to the different activities in monitoring outcomes or respectively the different designated use applied.

The viewpoint, formerly also stated in the German Society for Animal Production recommendations, that no selection at all should take place in conservation-breeding programmes, can no longer be maintained as it is. By now it has become clear that the economic inferiority in relation to standard breeds without selection is increasing even more dramatically. Experience gained continues to show that, after abandoning the initial designated use, and the selection based upon that, the net result is more formalism among the participants; with larger animals thereby getting preference, for instance. It must also be borne in mind that, after the frequently-applied change in the conservation breeds' designated use, for instance from milk production to keeping cows for breeding, the original genetic characteristics can be lost if there is no possibility to select accordingly.

2. Implementing conservation-breed programmes

2.1 Strengthening the breeding societies

So far as is possible, sustainable implementation of conservation-breeding programmes must be guaranteed within the area of responsibility of state-recognised, state-monitored breeding societies. Among livestock species for which no provision is made for such state recognition, organisations with appropriate specialist competence should take over implementation of conservation-breeding programmes; in the context of funding, they should be placed on equal status with state-recognised breeding societies.

- **For this purpose, the financial, technical and subject-specialist resources at breeding societies' disposal must be substantially improved and secured by means of better-targeted state aid.**

Among the recognised breeding societies, the subject-specialist and technical basic resources are there for implementing breeding-programmes. Moreover, breeding societies' activity is structured by law and is monitored by the state. Nonetheless the breeding societies' financial and human resources are often too limited for effective conservation-breeding programmes. Often one single breeding societies takes care of the herd-books of very many different breeds; also, the task of taking care of conservation breeds needs to be cross-financed from the revenues of breeding programmes for economical breeds.

2.2 Implementing the breeding programmes across individual breeding societies' boundaries

If the same conservation breeds are taken care of among several breeding societies – and especially if each breeding societies on its own has herd-book stocks that are too small – the conservation-breeding programmes must be conducted in collaboration between breeding societies, or at least coordinated effectively.

- **Even without funding being granted, there must be a demand that the breeding goals are coordinated for each breed, on a binding basis.**
- **A basic prerequisite for effective coordination or cooperation is that the herd-books are brought together at individual-breed level. If no common herd-book is created as part of this, at least it must be possible to have data-access, across the whole given animal population, for monitoring and also for**

managing the genetic variance.

- **Beyond this, forms of cooperation need to be further developed between the breeding societies involved, or the involvement of advisory councils for a given breed must be expanded. Through this, at least the coordination of the breeding programmes must be secured, as must also (if funds are granted) the implementation of a common breeding programme.**
- **It is conceivable to use a division of labour between existing breeding societies, at individual *Land* (state) level, as a suitable form of cooperation; in this, the areas of authority for the central management of breeding for certain breeds are each respectively allocated to one particular breeding society. Accordingly, that breeding society could also organise central classification processes for breeding, as well as shows. The key factor in allocating authority to that breeding society can be a regional area of emphasis in that breed's geographical spread, or an aspect in that breed's emergence.**
- **It is also worth considering, as a purposeful form of cooperation, to have a formal takeover of the breeding programme by a single breeding society; this would involve the other breeding societies continuing to render services within the framework of the breeding programme; an example is assessment of animals for the purpose of entering them into herd-books among the region's animal-keepers. As part of this, the volume of contributions or fees hitherto applied can also be maintained, broadly speaking.**

For historical reasons, and because funding in animal breeding is channelled through the *Länder* (states,) in Germany what has mostly emerged is regional breeding societies; these were originally active solely within the given *Land's* borders, although the breeds are often distributed across regional borders. In part, the same breeds lack common data-entry standards between the breeding societies or lack coordinated identification systems in the herd-books.

In individual cases, a cooperation across breeding societies takes place, but mostly this is limited to joint shows or auctions specific to a breed. Developments in sheep-breeding are encouraging; a uniform herd-book system for this is now clearly taking shape.

2.3 Particular aspects of conservation-breeding of poultry and rabbits

To implement conservation-breeding programmes regarding poultry and rabbits, in most instances there is still a need to put in place the organisational resources already provided with regard to horses, cattle, pigs, sheep and goats.

- **Breeding-books at least make it possible to monitor all breeding animals within a population designated for conservation, and also to monitor the genetic variance or the development of inbreeding; in the context of poultry and rabbits, such breeding-books are still absent in most instances. Nonetheless the recommendation is to establish breeding-books that take into account the particular features of these livestock species; it is also to concentrate future funding on conservation-breeding programmes which maintain such breeding-books. To establish suitable organisational forms and breeding-books, scientifically well-founded guidelines need to be created; compliance with these must be a precondition for funds to be granted.**
- **To assess status and the development of performance potential among conservation breeds, institutions should be set up for implementing the performance checks on a basis that spans across individual businesses.**

- **For poultry and rabbits, the Advisory Board must still define or respectively confirm risk categories that take account of these animal species' particular features.**
- **In order to demarcate conservation breeds and to develop efficient breeding operations for poultry and rabbit conservation, genomic information from scientific studies is available, at least in some instances. For breeds where the information is insufficient, targeted surveys must be carried out.**
- **The main parties involved in conserving old breeds of poultry and rabbits are breeders in the Association of German Poultry Breeders (*BDRG*), in the Central Association of German Rabbit Breeders (*ZDRK*), and also in the Society for the Conservation of Old and Endangered Livestock Breeds (*GEH*). Despite these organisations' different goals and points of emphasis in their interests, an understanding has been reached on common Red Lists for Poultry and Rabbits. The Advisory Board invites these organisations to participate in development of common guidelines for breeding-books and conservation-breeding activities.**

In the breeding of small animals, especially in the case of poultry, through the development of high-output breeding based on multiple crossings, commercial-poultry breeding based on breeding-books ceased to exist long ago in the private sector. The Animal Breeding Act (*TierZG*) is no longer applied to these species of animals; a consistent separation has developed between breeding companies for hybrid breeding as a whole and, by contrast, the breeders of pure-bred poultry and rabbits. Among pure-bred poultry and rabbits, the designation of a breed is strongly oriented to the phenotype; there are hardly any breeding-books with requirements comparable to those applied to large animals. Only rarely is a breeding-book maintained; this is also because, in the case of the common chicken, the monitoring of animals' parental lineage and the recording of individual animals' output is often too laborious, notably for those keeping animals as a hobby. Nonetheless, practicable models exist for conservation-breeding among poultry (e.g. 'conservation-breed ring' for 'Vorwerk' chickens; 'Diepholz' geese; breeding-book for the 'Lippe' or 'Leine' geese): these offer a concept that should be transferred to other breeds and expanded. To minimise any growth in inbreeding, these concepts for conservation-breeding concentrate on the systematic exchange of male breeding animals, because the maternal lineage can often not be determined.

The Association of German Poultry Breeders and the Central Association of German Rabbit Breeders, as umbrella organisations, represent the interests of many who own small animals as their hobby; only in few cases do such owners take part in breeding programmes directed at population genetics. Apart from representing committed animal breeders, the Society for the Conservation of Old and Endangered Livestock Breeds also represents numerous 'ark farms' which are interested in collaborating in a conservation-breeding initiative for poultry or rabbits. The build-up of specific conservation-breeding programmes should be reinforced by suitable funding measures. In particular, an infrastructure for suitable documentation of breeding must be built up in this way.

3. State involvement

3.1 State funding

Programmes of conservation-breeding do not directly generate economic benefit for the breeding organisations and breeders; rather, they usually need lasting financial support.

Any attempt to improve their implementation solely by introducing statutory rules would be counterproductive; this is because there would then be no willingness on the part of breeder organisations and breeders.

How the state funding is structured is decisive for the conservation-breeding programmes to be shaped and implemented in a sustainable, efficient way, appropriate to the purpose.

- **The payments for keeping animals of breeds that are under threat of extinction must be directed, in a more targeted way, to the implementation of conservation-breeding programmes.**
 - **The measures involved in breeding-programmes that span across companies must be able to be financed directly.**
 - **Such measures, suitable for funding within the framework of conservation-breeding programmes, include:**
 - *The use of herd-books/breeding-books,*
 - *Making artificial insemination available as a measure to flank conservation-breeding programmes,*
 - *Remuneration for the work involved in coordination and in breeding-management,*
 - *Provision of support to central breeding events,*
 - *Centrally-organised institutions, e.g. for breeding poultry and for monitoring its performance.*
- **The pay-out of payments for keeping animals and the selection of the animal-keepers thus favoured must also be able to be transferred to the breeder organisations that conduct the conservation-breeding programmes.**
 - **The result is that resources are increasingly awarded to animal keepers who actively participate in the conservation-breeding programme.**
 - **This also reduces the administrative workload involved in awarding the premiums.**
 - **To the extent that animal-keeping premiums continue to be paid out directly to the animal-keepers, two preconditions of this must be membership of the herd-book/breeding-book arrangement and active participation in the conservation-breeding programme.**
- **The structuring and the award of the funding must be more determinedly used as a means of state coordination and of steering the conservation-breeding programmes.**
 - **As far as possible, cooperation between breeding programmes for the same conservation breeds must be established as a precondition of funding.**
 - **Where purposeful, the funding for particular breeds must be regionally concentrated. Nonetheless a sufficient distance separating individual animal stocks is needed as a precaution regarding epidemic outbreaks.**
 - **The various *Länder* must coordinate the funding amounts and funding conditions.**
 - **The amount of funding premium given must be more strongly differentiated, relative to the respective measures taken:**
 - *Viewed as a whole, higher proportions of funding and higher payments are appropriate for severely endangered breeds.*

- *In addition, a higher level of funding must be directed to the use of animals in accordance with the original breeding goal, e.g. as dairy cows not as mother cows.*
- *Significantly higher payments must be paid for keeping male breeding animals; this is because of the outstanding effect that keeping them has on conservation of genetic variance and the particularly high workload involved in keeping such animals.*
- **Apart from funding for breeding-programme measures and also the award of animal-keeping payments, there is a need for further funding measures or state interventions to the benefit of conservation-breeding:**
 - *Establishing precautionary concepts against epidemic outbreaks that trigger-off far-reaching counter-measures, predetermined according to veterinary law (also for poultry and rabbits)*
 - *Competitions and the award of prizes for successful conservation-breeding programmes, including associated concepts of marketing and use.*
 - *New approaches to funding, e.g. start-up financing for more effective selection methods, to prevent breeds that are today still widely in commercial use from becoming pure conservation breeds*
- **Just as before, research projects and model projects must obtain funding from the Federal Government and from *Länder*. Because these funding instruments have a very limited time-frame, or are not tailored to suit the needs of genetic resources, provision must also be made for special funding instruments or budget resources.**
- **Implementation of almost all measures proposed in this recommendation appears to be possible solely if there is a broadening-out of the GAK-based funding principle for genetic diversity among farm animals ('GAK' - 'Joint Tasks for the Improvement of Agricultural Structures and Coastal Protection');** this change must favour a targeted funding of conservation-breeding programmes, not solely payments for keeping animals.
- **Alongside the funding, direct state involvement in the realm of conservation-breeding is also justified and desirable.**
 - **By making state personnel and state institutions available, the implementation of conservation-breeding programmes can be secured effectively.**
 - **Where suitable expert opinion deems it appropriate, state institutions should also maintain (or continue to maintain) conservation-breed stocks.**

Due to the constitutionally-predetermined division of tasks between the Federal Government and *Länder*, it is predominantly the *Länder* that are responsible for funding to agriculture and thus also for conservation-breeding programmes regarding farm animals. The *Länder* prefer co-financed funding measures (from GAK or the EU); therefore, they increasingly limit themselves to measures found in the catalogue of EU funding and that, as far as possible, are simultaneously also funded through the GAK. Within the national measures' framework, the EU is highly flexible in permitting the co-financing of measures aimed at conserving animal genetic resources. However, at German national level there is political resistance to direct funding of conservation-breeding programmes within the GAK framework. Thus the relevant GAK funds are mostly disbursed for animal-keeping payments, using a watering-can principle. The frequent dead-weight effects, the disproportionately high level of administrative workload, and the farmers' misgivings, due to the long, inflexible period of tying-up

resources: these are factors long criticised by specialists in this business. Yet this has not yet caused a change.

The federal structure and the current arrangement of decision-making authority make it particularly difficult to fund measures to be introduced nationwide, even if these are strategically important measures, such as the setting-up of a national gene bank. Model projects, to which the Federal Government must limit itself, due to limits to its decision-making authority, are not enough to deal with such tasks.

Precisely because there is a decline in the number of civil servants made available as managers of animal-breeding activities, the need for help of this kind only increases. It must also be emphasised which important contributions are made by state institutions to conservation-breeding measures; this includes the keeping of male breeding animals in the stud facilities at *Land* level, or through use of dairy-cow herds from endangered breeds in state-owned enterprises.

3.2 Recognition and monitoring of breeding societies

The Animal Breeding Act (*TierZG*) comprehensively makes arrangements for state recognition and monitoring of breeding societies.

- **The public authorities that have relevant decision-making authority must introduce stricter standards for the recognition of herd-books used for conservation breeds; in particular, they must demand proof of a conservation-breed programme satisfying the minimum preconditions stated in this Position Paper.**
- **If the conservation-breed programme applied for cannot by itself provide proof of a sufficient Effective Population Size [for a population oriented towards conservation in accordance with the National Programme ($50 < Ne < 200$)], although overall there is a sufficient number of breeding animals in Germany, that programme must be denied recognition as an autonomous breeding programme; instead, it must have cooperation imposed upon it.**
- **If recognition is already officially declared, but the respective individual breeding societies exhibit an insufficient level of Effective Population Size, the public authorities must make a check on whether to impose a cooperation on that conservation-breeding programme (see Section 5, The Animal Breeding Act (*TierZG*)).**
- **The public authorities must consistently supervise the current conservation-breeding programmes to determine whether, in particular, there is compliance with the measures required in the breeding programme and aimed at conservation of variability of the animal breed.**
- **On principle, crossings are not permitted without prior notification of the change being given to the breeding programme and without the public authority's consent.**
- **In order to run the processes of recognition and supervision, coordinated nationwide, it is recommended to develop a monitoring framework, with criteria for recognition and supervision, and to coordinate this between the *Länder*.**
- **Because the Animal Breeding Act (*TierZG*) is not applicable to small animals, a precondition that the conservation-breeding programmes must be state-regulated and state-supervised is not satisfied. However, through granting of funds by issuing a decree and through applying state guidelines, a comparable framework can be created.**

- **Funding-guidelines for conservation-breeding programmes regarding small animals, with these guidelines taking into account the breeder community's particular situation regarding these animal species, must also demand cooperation among recognised conservation-breeding programmes for the same breed.**

At present, as regards the extent and scale of state recognition and supervision of conservation-breeding programmes, substantial differences between the various *Länder* are obvious. In particular, it appears that, in part, there are hardly any checks if already-existing, recognised breeder organisations wish to open up new herd-books. Likewise, often there is evidently no specific description of the breeding measures envisaged, e.g. to manage developments in terms of inbreeding; this also prevents effective monitoring of the breeding programmes. Crossings, for instance in the case of horses, are not sufficiently addressed as an issue in supervision processes.

3.3 State management and coordination

If state funding-guidelines prove insufficient, it is necessary to check the degree to which the statutory authorisations ought to be used to issue ordinances or administrative regulations, for measures aimed at conserving genetic diversity among farm animals.

- **An ordinance governing the principles that apply to breeding programmes aimed at conserving genetic diversity (Section 8, Para. 1, Item 1 1 (f), Animal Breeding Act, *TierZG*), can bring about a more binding commitment to necessary elements of conservation-breeding programmes, if recommendations and subject specialists' guidelines continue to be without effect.**
- **As soon as viable scientific rules are provided for this, and the additional workload involved is coordinated with the breeder organisations, the Ordinance on Implementation of Monitoring must be issued (Section 10, Sentence 1, Item 1, Animal Breeding Act, *TierZG*).**
- **It is recommended to the Federal Government and the *Länder* to involve the Advisory Board to a greater degree, as a representatively-constituted committee with specialist expertise, in the preparation and decision-making on the guidelines for implementing and funding conservation-breeding programmes.**

Statutory authorisations to issue ordinances, stated in the Animal Breeding Act (*TierZG*), are not hitherto being used; on the one hand, this is because the scientific rules are not yet elaborated, concerning the information needed to conduct monitoring; on the other, it is because hitherto it did not seem fully necessary to have a ruling on the principles applied to conservation-breeding programmes. If the obvious flaws in implementation of conservation-breeding programmes cannot be eliminated in another way, this raises the question of whether ordinances must be introduced.

Frequently, at Federal and at individual *Land* level, funding measures are prepared and issued without involving the Advisory Board. In order for the Advisory Board to exercise its coordinating and counselling role, as provided for by the Federal Government and by the *Länder*, the Advisory Board's expertise must be involved to a greater degree in the decision-making on measures to be taken.