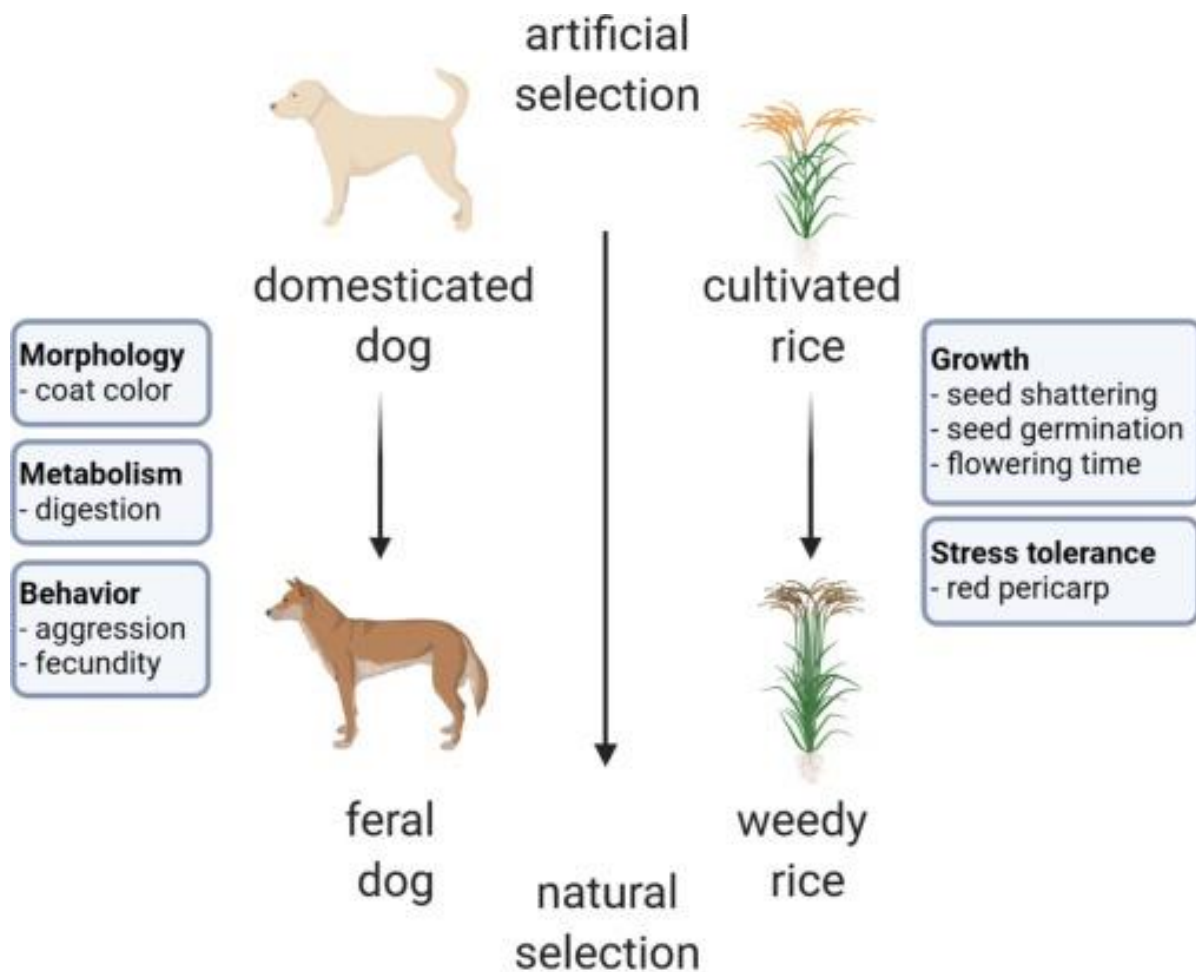




De-Domestication: Back to Nature?



Trends in Plant Science

Source: Scossa, F.; Fernie, A. R. (2021): When a Crop Goes Back to the Wild: Feralization

10 years ago, the SAVE Foundation addressed the topic of "wild livestock populations in Europe". At that time, SAVE systematically recorded the occurrence of these populations in Europe for the first time. In particular, the ecological effects were highlighted, because in many places feral livestock populations are more likely to be harmful than valuable for the respective ecosystem.

This not only applies to the animal sector, but also to crops. The phenomenon of de-domestication is omnipresent worldwide in both farm animals and crops. Occurrences of former cultivated plants are

known, which have a particularly invasive effect and displace the native flora. But there are definitely former cultivated species that have fully integrated into Central European ecosystems and are on the way to being re-domesticated again. However, the development and effects of de-domesticated varieties and breeds have only been insufficiently investigated so far. Perhaps the new possibilities of genetic investigations can help to close important gaps in understanding de-domestication and the importance for the environment, but also for breeding and use.

An example of de-domestication, adaptation to the ecosystem and renewed re-domestication is the evening primrose (*Oenothera biennis*). It was originally introduced in Europe as an ornamental plant from North America in the 17th century and is now considered as a character species of *Echio-Melilotetum* (sweet clover meadow). As "ham root" its roots were eaten in the 18th and 19th centuries and today there are again attempts in the agricultural cultivation of obtaining evening primrose oil.

Rewilding is not a simple reversal of domestication, but a dynamic demographic process. As with domestication, there are incomplete transitions, admixtures and introgressions. Feral populations have not simply escaped; they form isolated groups of domesticated populations in the wild. They are constantly intermingling with natural, domesticated, and other feral populations. This complex combination of processes makes it difficult to unravel the effects of de-domestication, local adaptation, and natural selection. Some populations also receive limited, deliberate human support. This applies in particular to livestock populations living in the wild.

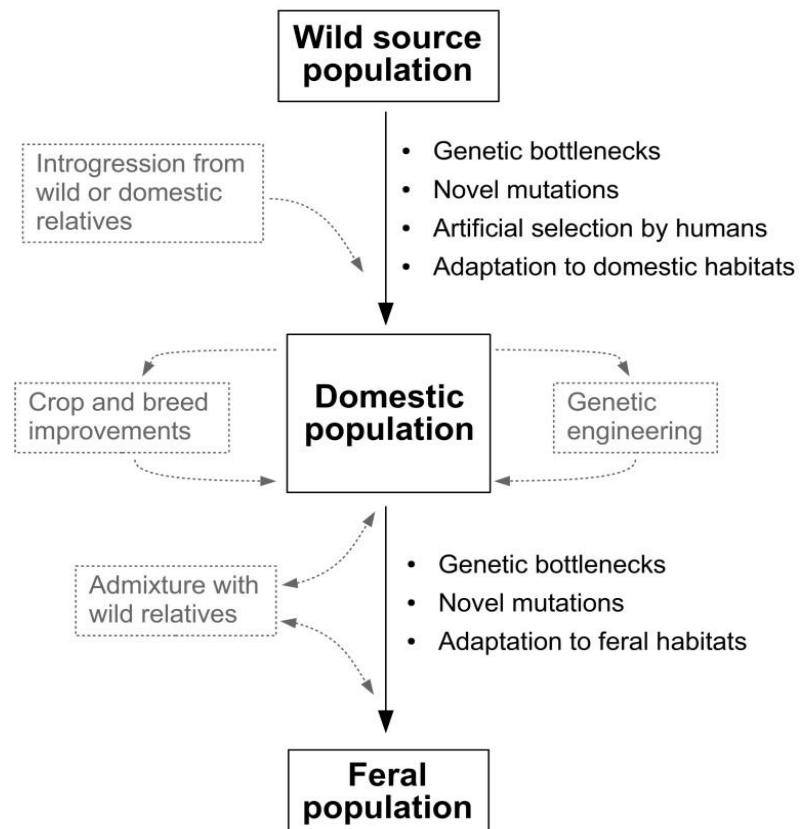
We know that the domestication of animals and plants brought great advantages for humans, as it triggered the Neolithic revolution 12,000 years ago. Domestication and breeding ultimately led to the fact that the plants and animals could hardly survive in the wild without human help. Nevertheless - domestication is not necessarily a one-way street in the direction of a genetic bottleneck and thus a depletion of the gene pool of a breed or variety. There are forms of husbandry that oscillate between wild and domesticated forms, such as the Retuerta horses in the Coto de Doñana National Park in Spain. "Wilderness" does not necessarily mean a return to the traditional "wild" habitat. Feralization often takes place in (agricultural-anthropogenic) disturbed environments. Since it is not humans but the habitat, the environment, that determines reproduction, very rapid evolutionary changes and adaptations can take place. An impressive example are the "Swona" cattle, which were left behind on one of the Orkney Islands in Great Britain in 1974 and developed so much in this inherited landscape that they now could not survive living in barns.

Research has succeeded in better understanding the pathways of

"feralization" with DNA-based reconstructions of ancestors and adaptation tests. "Endoferal" populations developed from a single breed or variety, Exoferal "populations developed by mixing different varieties or breeds or by mixing native taxa and the respective breed or variety. Examples in Europe of "exoferal" populations are hybridizations of wild Jerusalem artichoke (*Helianthus tuberosus*) and domesticated sunflower (*Helianthus annuus*) or a rather rare hybridization of ibex and goat in the Alps with fertile offspring.

Endoferal examples are the Swona cattle mentioned above or the aggressive expansion of originally domesticated rice in North America and Asia. Endoferality corresponds to people's conception of "ferality" or "de-domestication", of which there are many activities in Europe that, for example, rely on grazing with large herbivores and therefore consciously release robust breeds into the wild.

Exoferality includes "admixture". The gene flow influences local establishment and adaptation and fitness. An increasing phenomenon is overgrown transgenes (an introduced gene of a different species) that occur in non-agricultural plant populations such as wild cotton or in crops such as maize, rape and soybeans.



Trends in Ecology & Evolution

Source: Gering, E. et al. (2019): Getting back to nature: feralization, Trends Ecol. Evol. 34, 1137–1151



Evening Primrose (*Oenothera biennis*)

Through modern re-research, more and more wild populations with exoferal influence will be discovered in the future and clearer statements about the descent can

be made, as in the case of the Przewalski horses where actually wild descendants of horses domesticated by the Botai culture have been proven. Genes from 23 of the 25 most important domesticated plants known to mankind have been found in wild populations. The geographical distribution and the phenotypic consequences of this mixture of cultivated and wild plants vary greatly from case to case. The same applies to animals such as wolf × dog, chicken × red junk fowl and bred × wild salmonid hybrids in fish farming.

Presumably, preferred alleles during breeding that accelerate growth or fertility can play an important role in establishing and expanding in wild populations. However, the “fitness phenotypes” in wild populations still need to be examined more closely.

In order to fully understand the biology on which naturalization is based, integrative approaches based on phenotypic and genetic data and information are important in order to understand the interlinking of characteristics that ensure survival in the wild and under environmental stress factors. Repeated admixture of domesticated populations and introgression with wild relatives in the vicinity of a population determine the development of the feralization. Domestication events far in the past can also be better understood, because “real” precursor species can now be better distinguished from the wild ones.

A gene flow takes place between most of the domesticated and wild populations, which has arisen through an accumulation of adaptive variations, which require better adaptability to the respective environment.

Most wild populations experience gene flow with related wild populations, creating regions of the genome that are enriched for adaptive variation.

The (re) introduction into crop species can support this variation in adapting to environmental and climate stressors.

The conservation of feral populations continues to be a “reservoir” for special properties. This can even lead to re-domestication if this “gene pool” is conserved. This is believed to be easier with animal populations than with feral crop populations.

Feral Future

With climate change and the challenges that come with it, breeding is looking for ways to cross locally adapted variations of wild populations into domesticated populations in both plants and animals. Sometimes it can be more expedient to consider the characteristics of feral populations and not just look at the wild relatives.

The similar genetic background of a feral and a domesticated population promotes adaptive introgression (transfer of a desired trait from a wild species to a domesticated species). Adaptive alleles such as a certain disease resistance can



Axios Horses Greece. Source: Amalthia

be crossed into a culture species or breed and lead to faster breeding successes.

Sources: Gering, E. et al. (2019): Getting back to nature: feralization, *Trends Ecol. Evol.* 34, 1137–1151 <https://doi.org/10.1016/j.tree.2019.07.018>

Scossa, F.; Fernie, A. R. (2021): When a Crop Goes Back to the Wild: Feralization <https://doi.org/10.1016/j.tplants.2021.02.002>

Makenzie E. (2021): Feralization: Confronting the Complexity of Domestication and Evolution <https://doi.org/10.1016/j.tig.2021.01.005>

Crop Wild Relatives: Global Standard for Data Exchange



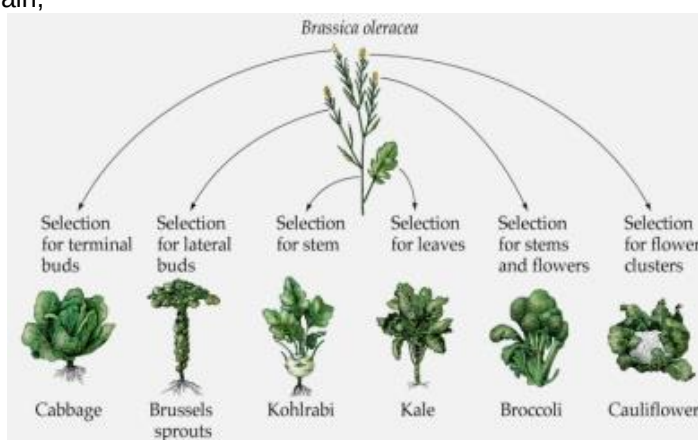
Our most important staple foods such as grain, tuber- and root vegetables, pulses and many more have been bred from wild relatives, the “Crop Wild Relatives”. The wild relatives are still enormously important for the food supply of the future, because they have an inestimable pool of genetic diversity due to their hundreds of thousands of years of adaptation to pests and diseases, climate and environmental influences. In the search for plants that are adapted to our changing environmental conditions such as climate change, the genetic diversity of the Crop Wild Relatives is particularly important in addition to the diversity of locally and regionally adapted land races. But the wild relatives of our cultivated plants are highly endangered, as a study recently published in America clearly shows. The distribution of 600 taxa was studied. These include barley, beans, grapes, hops, plums, potatoes, and other foods. The result is worrying: more than half of the wild relatives are endangered in their natural habitats.

Better collaboration between gene banks, botanical gardens, conservation NGOs, and conservation organizations is needed to stop the decline in Crop Wild Relatives - and not just in America! It is important to protect natural habitats better and, in addition to the efforts of science and practice, it is also important to arouse public awareness. This could very well be done via the botanical gardens. The protection of habitats means not only the

preservation of biodiversity in itself, but very often also the preservation of our food sources.

The scientific aspect is regulated by ITPGRFA, the FAO's international treaty on plant genetic resources for food and agriculture. The ITPGRFA has now agreed on a globally agreed standard for the exchange of data on in-situ occurrences of Crop Wild Relatives. A list of descriptors (CWRI v.1, Descriptors for Crop Wild Relatives conserved under in situ conditions) drawn up with more than 107 experts from 87 institutions and 48 countries now closes an important gap in the exchange of information. The exchange of data and information worldwide is just as essential for efficient use, monitoring and reporting as it is for plant breeders, researchers and organizations dealing with biodiversity in agriculture.

An international language for CWR in situ data has been developed that enables countries to compile and share data from various national and international organizations, advanced research institutes, and others. Scientists documenting the in-situ oc-



Wild mustard species still abound across Europe, Asia, and North America. Source: <https://iowaagliteracy>

currence of Crop Wild Relatives can now use the descriptors to exchange their information with inventories, platforms and databases. For each descriptor, this tool provides a brief explanation of the content, its coding scheme and a suggested field name.

Alercia, A., López, F., Marsella, M., and Cerutti, A.L. 2021. Descriptors for Crop Wild Relatives conserved in situ (CWRI v.1). International Treaty on Plant Genetic Resources for Food and Agriculture. Rome. FAO. . <https://doi.org/10.4060/cb3256en>

Uniqueness of the "Balusha" sheep genetically proven



The brown headed Balusha Sheep – unique in the world

The Balusha and the Bardhoka sheep are autochthonous sheep breeds of the Dukagjini plane, southwest of Kosovo. In Summer 2017 at the annual traditional shepherd's festival in the Karst Mountains of Suva Planina near Istog in western Kosovo (see SAVE eNews 3/2017) both breeds could be seen alive in the field. Both sheep breeds are highly endangered. The Balusha sheep breed is with around 300 animals in high danger of extinction. The population numbers of the Bardhoka sheep are higher, but they are also endangered. In December 2017 we raised funds to support the establishment of a breeding programme. With the funds we could support a serious investigation of samples at the university of Giessen, Germany. Thanks to the voluntary work of collecting the samples and also at the university, we only had to pay the external laboratory work. The results show, that it makes sense to start a breeding programme. Here the final report of the genetic investigation:

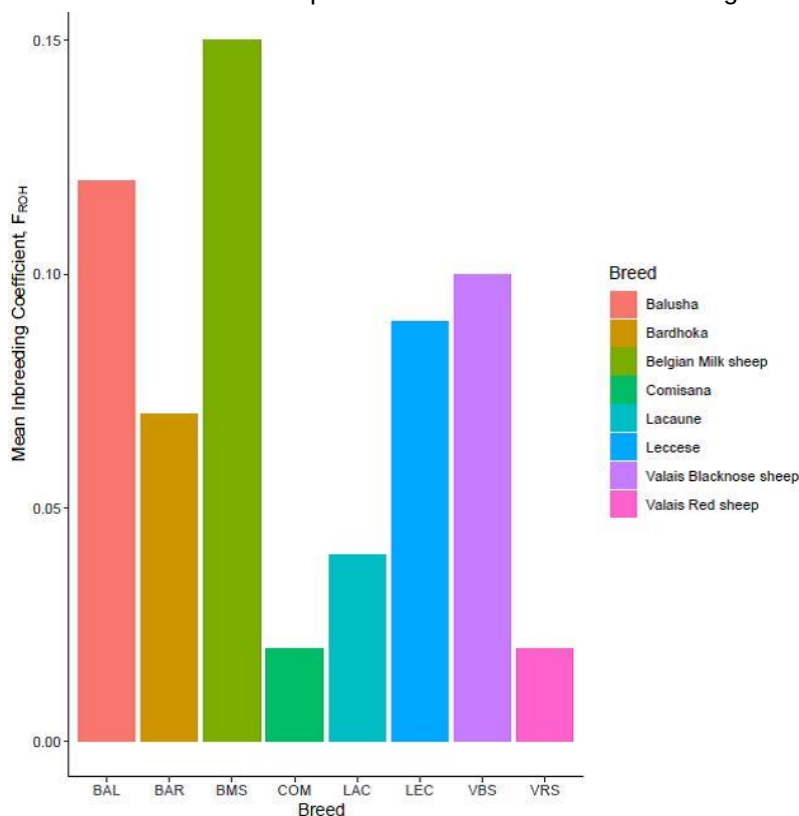
To be sure, that there are enough lines left for a breeding concept, SNP based genetic characterization took place of individuals of this unique breed. The breed name

Balusha is derived from the Albanian word for "bale spot", describing the darker coloured head area of the animals. Balusha sheep are used as a triple purpose breed for the production of milk, meat and wool and are perfectly adapted to their habitat. Due to the small population and regionally restricted distribution, the Balusha sheep is highly threatened with extinction. Immediate action (conservation program, breeding strategy, support from the authorities) is essential to conserve the genetic potential of this breed as a "breed of the past, of today and the future" (Bytyqi, 2015).

Blood samples from 46 Balusha sheep and 29 Bardhoka sheep were collected by employees of the University of Prishtina - Agriculture and Veterinary Faculty. Samples were taken from the two biggest flocks which represent about 50 percent of its total population and of animals which were as less related as possible.

Materials and Methods

The samples were genotyped on the Illumina OvineSNP50 beadchip. After genotype quality control (QC) procedures using PLINK v1.90 (Chang et al. 2015), a total of 40,364 autosomal SNPs and all 75 samples remained in the dataset for genomic-

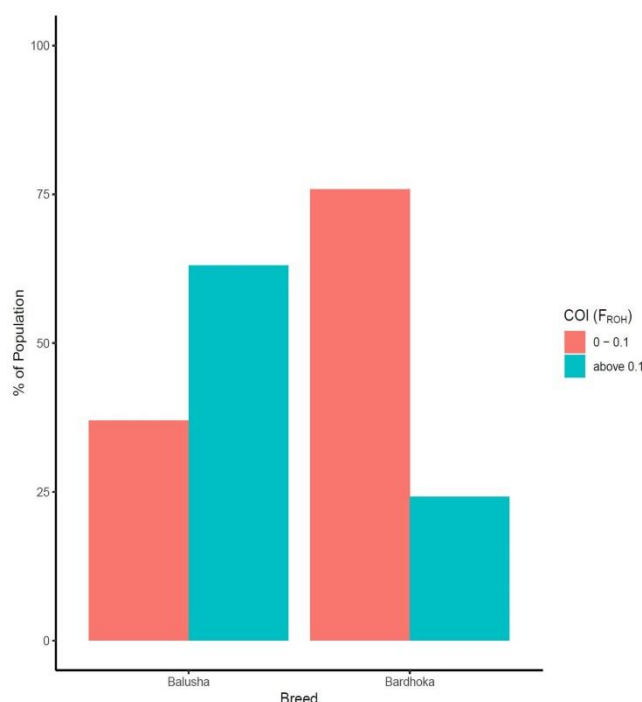


Average Inbreeding coefficients of different sheep breeds

based diversity analysis. Principal component analysis (PCA) was performed in PLINK v1.90, and a plot showing the first two principal components was constructed. Furthermore, the (individual) inbreeding coefficients (FROH) based on runs of homozygosity (ROH) was estimated using the consecutive runs method in the R package “detectRUNS” (Marras et al. 2015; Biscarini et al. 2018). Mean FROH values were compared with published values from other sheep breeds also estimated from Illumina OvineSNP50 beadchip genotypes.

Results

The Principal component analysis (PCA) plot shows a clear genetic separation of Balusha and Bardhoka populations, presenting the Balusha sheep as a very homogeneous genotype and different from all other breeds in the world. Estimated inbreeding coefficients (FROH) were 0.12 and 0.07 in Balusha and Bardhoka flocks, respectively. The higher inbreeding coefficient in Balusha indicates that this breed is at a higher risk of inbreeding depression than the Bardhoka breed. A comparison of our result with other studies of sheep breeds in Europe shows the inbreeding coefficient of Balusha as the second highest (Mastrangelo et al. 2018; Meyermans et al. 2020; Signer-Hasler et al. 2019). In addition, the individual FROH values revealed that



Proportion of sheep with lower (0-0.1) and higher (>0.1) inbreeding coefficient (COI) in the Balusha and Bardhoka sheep breeds

about 37% of the Balusha population had an inbreeding coefficient between 0 and 0.1, whereas this proportion of sheep was about 75% in Bardhoka.

Conclusions

•The Balusha sheep is a genetically uniform breed.

•The Balusha breed is clearly distinguishable from the Bardhoka breed, although this is the breed which is most often used for crossbreeding.

•It is very likely that a single crossbred animal with the Balusha breed phenotype was detected by molecular genetic testing in this study.

•The inbreeding coefficient of the Balusha breed is higher than recommended (over 0.1); therefore, a breeding strategy to lower the inbreeding coefficient is recommended.

•About 37% of the analyzed Balusha sheep had an inbreeding coefficient lower than 0.1 and are available for breeding in order to conserve the genetic diversity in this breed.

•Conserving original breeds is considered important and sensible (advisable) in terms of conservation of cultural heritage and genetic diversity (gene reserves).

Call for Action

To achieve a serious breeding programme to avoid the extinction of the breed and the traditions around, funding is needed to establish a nucleus herd with the most less inbred lines, to train the farmers how to run a herdbook and last but not least to establish a good marketing programme to market the products and to keep this breed together with the traditions in the Dukagjini plain of western Kosovo. About €5000 are needed to establish a nucleus group with the most important breeding animals. With around €10000 we can train the farmers to understand the herdbook breeding and to discuss possibilities of how traditional and innovative products can be marketed.

The establishment of a nucleus group is the priority at the moment and be achieved together with our partners at the university of Prishtina. The latter part of the project can take place as soon as the pandemic situation allows travelling, so that SAVE staff can provide support on the ground.

In the name of the Balusha sheep we thank you very much for your support:

SAVE Foundation, 9000 St.Gallen, Raiffeisenbank St.Gallen, CH-9001 St.Gallen IBAN: CH27 8080 8008 5839 3255 6, BIC / SWIFT: RAIFCH22XXX. Keyword: Balusha

Authors of the study: O. O. Adeniyi¹, H. Bytyqi², W. Kugler³, H. Mehmeti², K. Berisha², R. Simon¹, G. Lühken¹

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International Year of Fruits and Vegetables



It is interesting that the global production of fruit and vegetables increased by around half between 2000 and 2018. In southern and western Europe (fruit and vegetables) and in northern Europe (vegetables), however, production stagnat-

The UN General Assembly designated 2021 the International Year of Fruits and Vegetables (IYFV).

The generic term "fruit and vegetables" encompasses an incredible variety of species, varieties, cultivation systems, agro-climatic conditions, and operating and marketing systems, so that it is not possible to describe a uniform production approach. In order for production to be sustainable, the practices and technologies must be adapted to the local context - as is the case with traditional varieties and small-scale cultivation in many places today: 80 percent of the world's food is produced by small-scale family businesses, 50% of which is fruit and vegetables. (FAO and IFAD, 2019) In Europe and North America, medium-sized farms of 20-200 ha predominate.

The fruit and vegetable sector helps to increase biodiversity, create environmental sustainability and improve the livelihoods of farmers and workers who operate along the value chains, according to the United Nations. Diversity also means ecological balance: harvest residues are used to feed cattle and manure to fertilize plants. Different cultures are home to pollinating insects and beneficial insects that fight pests. One of the challenges in production is the often high work intensity. However, the added value is usually higher than with staple foods.

In 2018, 868 million tons of fruit and 1089 million tons of vegetables were produced worldwide (FAOSTAT). The most important fruit in the world is the banana, the most important vegetable is the tomato, followed by onions and cabbage.

Most fruit and vegetables are produced in East Asia. In Europe, the south is particularly important for fruit production. Northern and Western Europe produce relatively little fruit and vegetables in relation to consumption.

ed or even declined.

Although the production of fruit and vegetables is growing worldwide, it is still not enough to adequately supply the world's population. In 2000 world production was only 306 grams per person per day. Up to 2017 it was 390 grams (FAO, 2020) - but this includes inedible parts such as kernel and shell as well as losses and waste, which are often very high. The WHO recommends at least 400 grams of fruits and vegetables per day.

The cultivation of annual species and varieties such as cabbage and onions depend on high-quality seeds or other planting material in order to achieve high yields. Perennial plants such as citrus fruits, apples and grapes are propagated by clones or scions. This propagation material must be genetically pure, have a high germination rate and should be disease free. The varieties must be adapted to the local environment and market preferences in terms of colour, shape and taste. And they have to be available for the market in different forms: fresh, dried, canned, juiced or fermented (FAO, 2001).

In many countries, high quality planting material is not readily available. Suitable improved varieties either do not exist or are in short supply. There are few tissue culture programs for producing plant material. Owning seeds and / or exchanging planting material with neighbours is therefore tradition and promotes the local varieties in many countries of the south. The problems of concentration and legal restrictions in the seeds sector are well known.

More information: <http://www.fao.org/fruits-vegetables-2021/en/>
<https://doi.org/10.4060/cb2395en>

The Kecskemét Sheep



Can we still talk about landraces in the 21st century? Absolutely!

Does it still make sense to breed them? For sure!

Fortunately, in today's fast-paced and profit-oriented world, livestock keepers and breeders are increasingly working with an ecological approach. Really sustainable and environmentally adapted husbandry and use can only be achieved with local breeds.

The yellow-nosed sand sheep is such a locally adapted land breed, known between the Danube and Theiss. However, in the last few decades it can only be found in the sandy steppes around Kecskemét. Therefore, this local variety is now called the Yellow Nose Kecskemét sheep. It is a three-use ecotype.

The selection for the yellow head, strong physique and milk yield was started in the late 1950s by Imre Gyulai and Antal Ábel. From oral reports it is known that in the 1950s and 1960s yellow-nosed sand sheep were grazed on the border with Kecskemét, herds from the two above mentioned breeders.

External characteristics: weight floodplains: 55-75 kg, ram: 95-125 kg

Head: medium-sized, rams-nosed, hornless, mostly hairless

The rams have two head shapes, an elongated, narrow and hairy head and a shorter head with a woolly, wider forehead. The long ears are drooping. The ear length was related to milk production and teat length.

The slate-gray claws are very hard and insensitive and therefore well adapted to sandy, stony soils.

The neck is moderately muscular in the floodplains. The back and loins are long, straight, and moderately muscular. In floodplains, the belly becomes more voluminous with age. The trunk is slightly sloping, moderately muscular. The bones are strong

and the udder is well developed. The limbs are relatively long. The head and legs are yellowish brown or russet.

The fur has a white, curly texture. Most lambs are brown, dark brown, and smooth-haired at birth. Only later does the wool turn white. The wool covers the neck and upper body. It extends to the hocks, but sometimes only to the middle of the foot. In some animals the forehead is covered with wool and appears as a white spot (rosy forehead). The belly is not covered with wool, which makes milking easier.

For the shepherds of Kecskemét, a real yellow-nosed sand sheep had to have a black spot on one part of the body. Even today, farmers attach great importance to this.

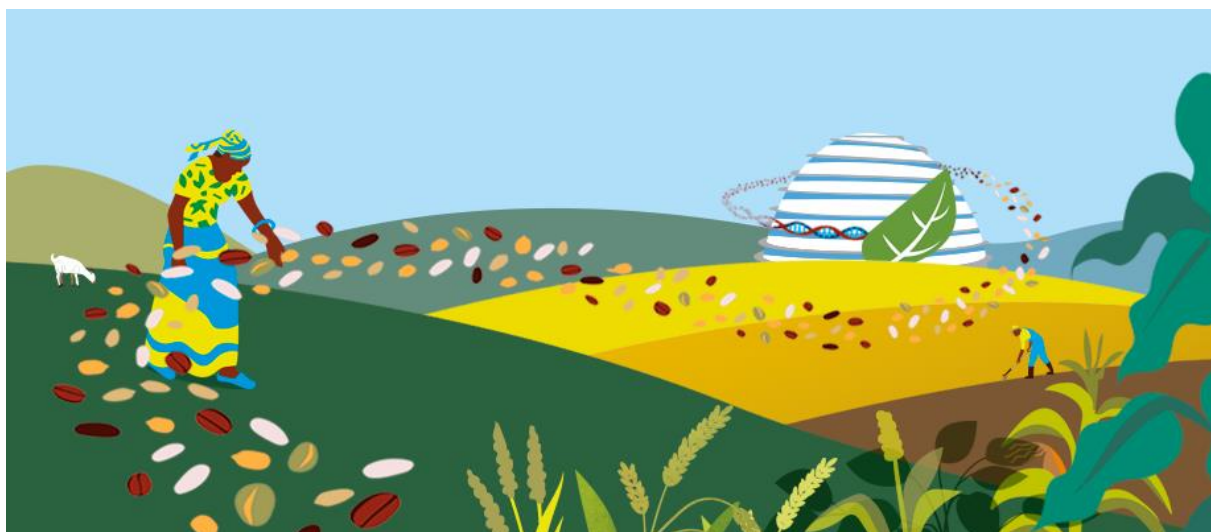
Mitochondrial DNA tests have shown that the genetic

diversity in the floodplains is great. It is therefore definitely worthwhile to continue breeding and to observe more closely the special characteristics of this variety, which is well adapted to the local conditions of Felső-Kiskunság.



Contact: László Hegedűs animal husbandry engineer, Szent István Egyetem (University of Agriculture and Life Sciences, Hungary)

What Should Farmers' Rights Look Like? The Possible Substance of a Right



„Farmer's Rights" is an official term of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA, Art. 9). In order to make visible the important contribution to conservation, Recognize the improvement and provision of the plant genetic materials necessary for nutrition and agriculture, farmers should be in a special focus of the treaty. But so far attempts to fill the term with content and to define it in an international accepted way have failed. A technical ad hoc expert group on the concept of "Farmer's Rights" (AHTEG-FR) under the patronage of ITPGRFA is committed

consultations and negotiations are therefore necessary and customary in international treaties.

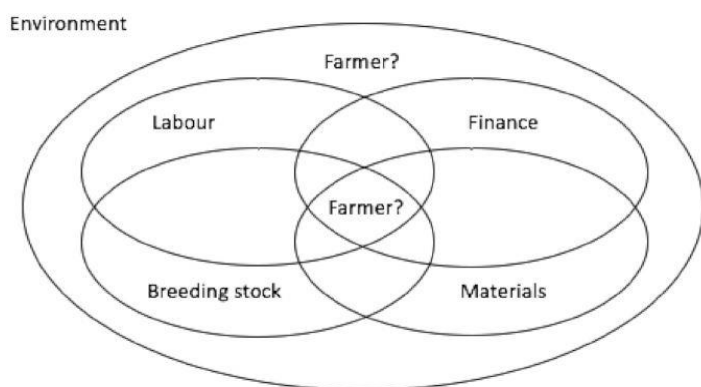
In a workshop at Griffith University in Australia in February 2020, a different approach was highlighted: important definitions of individual aspects (example: "Farmer") were recorded and described in order to identify the essential rights of farmers. The workshop included scientists from universities in southeast Queensland, Australia, with different disciplinary interests. Consensus declarations of the workshop have now been summarized and a possible framework was outlined in order to substantially define the "Farmer's Rights". A list of possible material rights of the farmers was drawn up, which can be used as a contribution and basis for further consultations and negotiations.

The overview of the ITPGRFA text on "Farmer's Rights" and the developments after the entry into force of the ITPGRFA, both within the ITPGRFA Governing Body and in a series of consultations, is also very valuable. Although the ITPGRFA was concluded in 2001, there is still much to be done to create clear legal certainty within the framework of the International Treaty on Plant Genetic Resources for Food and Agriculture at

national and international level.

Source: Adhikari, K.; Bikundo, E.; Chacko, X.; Chapman, S.; Humphries, F.; Johnson, H.; Keast, E.; Lawson, C.; Malbon, J.; Robinson, D.; et al. What should farmers' rights look like? The Possible Substance of a Right. *Agronomy* 2021, 11, 367.

<https://doi.org/10.3390/agronomy11020367>.



Agriculture depends on collaboration with other key economic sectors in any economy. Source: Adhikari et al, 2021

to filling the term "Farmer's Rights" with content. Debates on views, experiences and procedures were held in order to define the "Farmer's Rights" in a generally binding manner. A clear and internationally recognized definition of "Farmer's Rights" is urgently needed in order to have an appropriate and binding legal language and legal certainty both internationally and in national legislation. International

Newsflash

European Genetic Resources Strategy

GenRes Bridge



Genetic resources for a food-secure
and forested Europe

Your voice in a future strategy for conservation and sustainable use of genetic resources in Europe:

The European Genetic Resources Strategy is envisioned as a policy framework for se-

curing biodiversity for agriculture and forestry in the region to complement the EU Biodiversity Strategy for 2030 and the Farm to Fork Strategy in the frame of the European Green Deal.

The fourth draft of the European Genetic Resources Strategy for public consultation is available now via an online survey.

Whether you are involved in farming, forestry, breeding, genebank or protected area management, policy development, research, or in the food and product supply chain, please fill in the survey.

The survey should take 15–30 minutes to complete (depending on how much feedback you choose to provide), and will be open until 00:00 CET on Sunday 18 April 2021. Go to survey:

<https://bham.onlinesurveys.ac.uk/eqrs-stakeholder-survey>

News from DAGENE



Due to a lot of manuscripts submitted at the occasion of the DAGENE meeting 2020, the DAGENE

Journal 2020 (Danubian Animal Genetic Resources, DAGR Vol. 5 part 1 and 2) was published in two parts recently. There are very interesting articles about scientific results of investigations on animal genetic resources of the Danube region. Download here: <http://www.dagene.eu/index.php/hu/dagr>.

The DAGENE general assembly will take place online this year at 9th April 2021, 14:00 on Skype. The annual meeting 2021 was originally envisaged for Mai-June 2021 in Austria. But due to the pandemic it takes place in autumn at the earliest. More information: <http://www.dagene.eu/index.php/hu/>.

Frutti dimenticati e biodiversità recuperata

Forgotten Fruits and recovered Biodiversity

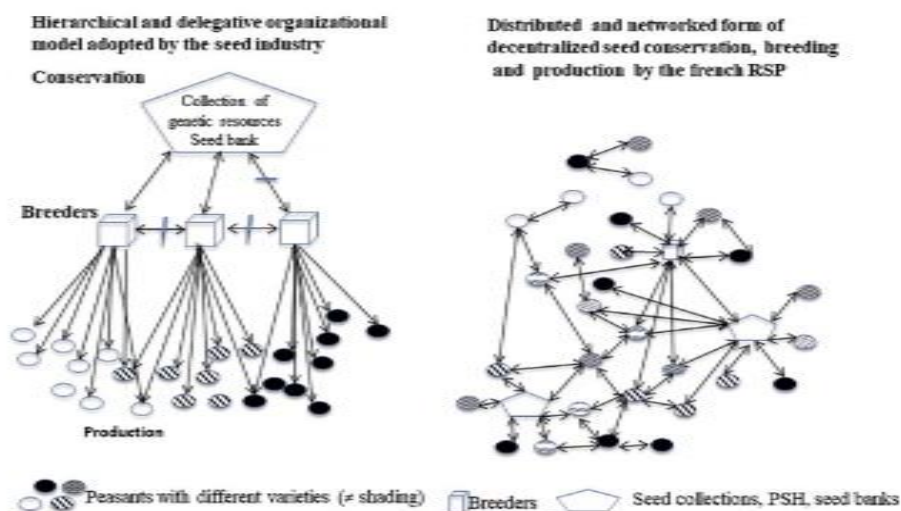


Based on the history of fruit growing and the description of characteristic landscapes with fruit trees, this interesting book describes which specific initiatives have been taken to restore, preserve and improve the genetic resources of fruit. Descriptions of around 30 typical varieties, with their special characteris-

tics, their endangerment status and conservation measures as well as agronomic, commercial and organoleptic characteristics, the traditional uses as well as photos and information on the sources and experts round off the work. in Italian language:

<http://www.biozootec.it/coltivazioni/guidi-s-2020>

Restoring cultivated agrobiodiversity in France



Source: A.Mazé, et al (2021)

Conserving agrobiodiversity is a major challenge in the European context, where, after several decades of modernization of agriculture, there has been a massive loss of collective knowledge about land races and ancient varieties. Among the European countries, France is considered to be one of the countries with a greater loss of cultivated agrobiodiversity, especially for main crops such as small grain cereals (wheat, barley, oats, rye and triticale). Recent studies have also shown a decline in the climate resilience of European wheat as a result of high performance breeding. In the last years, a number of peasant seed initiatives in France have played a key role in raising awareness of the benefits of living agrobiodiversity in the field and promot-

ing the reintroduction and conservation of landrace and ancient varieties.

Restrictive seed laws and persistent misunderstandings severely limit the integration of agrobiodiversity on farms. So far, valuable lessons from studies have not reached general debates and policy decisions on the future of agriculture in the European context.

The study contributes to these debates by examining the specific traits that characterize knowledge networks such as the French Farm Seed Network, the Réseau Semences Paysannes (www.semencespaysannes.org) and, in particular, its "participatory wheat breeding group".

Source: Mazéa A., Domenecha A., Goldringer, I. (2021): Restoring cultivated agrobiodiversity: The political ecology of knowledge networks between local peasant seed groups in France, *Ecological Economics*, 179.

www.sciencedirect.com/science/article/abs/pii/S0921800919318439

The future of a sustainable sheep and goat breeding



An international congress on Sheep and Goat breeding took place on October 15-16,

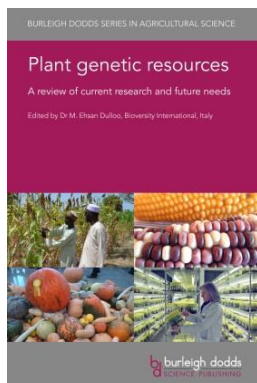
thus also contribute to the maintenance of biotopes. They promote biodiversity and sustainability.

With sheep and goats, valuable products can be gained from grass and, in the case of goats, also from leaves of shrubs: milk, meat and wool. They therefore contribute to the income of the farmers.

The International Congress on the Breeding of Sheep and Goats intended to give an impression of sheep and goat keeping at global level, to translate new research results into practice, to identify the real-world need for research, and to contribute to networking. More than 300 participants from 40 countries joined the conference with 120 contributions on latest topics. The book of abstracts is available on: <https://sheepandgoats2020bonn.org/>.

2020 in Bonn, Germany. Due to pandemics the congress was organised as a hybrid event with a few participants on place and a big international audience virtually. Sheep and goats are among the oldest domestic animals. Approximately one billion sheep and 600 million goats are kept worldwide. They are used for landscape management purposes, e.g.: to keep heathlands open or to maintain the dykes along coasts and rivers. Sheep and goats

Plant Genetic Resources



The book assesses ways of valuing and monitoring plant genetic diversity and discusses advances in in-situ and ex-situ strategies for conserving plant genetic diversity. It concludes by reviewing ways of enhancing the use of plant genetic diversity, including participatory plant breeding programmes and more effective

seed systems.

Plant genetic resources: A review of current research and future needs will be a standard reference for university and other researcher, staff managing genebanks and germplasm collections, government and other agencies regulating the collection, storage and exchange of germplasm, as well as companies involved in crop breeding.

<https://shop.bdspublishing.com/store/bds/detail/workgroup/3-190-89127> .

Last but not least

Lanzarote Vineyards



The vineyards of Lanzarote are a testament to the hardiness of certain grape varieties and to the human ingenuity. Part of the Canary Islands, Lanzarote is located off the coast of north-west Africa. Its

vineyards border a still-active volcano, Timanfaya (part of the Timanfaya National Park).

Digging crater-like hollows (hoyos or gerias) vintners plant their vines deep into the soil, past the layers of ash. They fence off the sea-facing side

with low, semi-circular walls made with lava stone. This protects the vines from winds blowing in from the Atlantic Ocean. Each vine grows on one solitary, dug-out crater, which can be as much as 30 feet wide and 15 feet deep. The array of crescent-shaped stone walls (called zocos) cocooning spots of verdant green offers a patterned visual splendor in an otherwise arid landscape.

Lanzarote reds, whites, and rosés tend to be light and crisp. Here one can find the listán negro grape, which was brought to California by Spanish settlers but did not survive there. On Lanzarote, these grapes thrive, and make a deliciously earthy rosé. The terroir provides a distinctive mineral quality to the wines, and it should be noted that most of the grapes here are indigenous varieties, free from the grafting required of most European grapes, which might otherwise fall susceptible to the vine-destroying aphid known as phylloxera.

We wish you all Happy Healthy Easter!

