



TRANSHUMANCE 360°

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TRANSHUMANCE

Transhumance refers to the seasonal movement of people with their livestock between geographical or climatic regions.

[Source: UNESCO]

This booklet accompanies the immersive exhibition Transhumance 360°. The exhibition was produced at the suggestion of CIRAD researchers to mark the International Year of Rangelands and Pastoralists, and conceived by Guillaume Duteurtre, Head of the SELMET joint research unit at CIRAD.

Exhibition website:
<https://transhumances360.org/>















Preamble

At the heart of transhumance: an immersive round-the-world tour

Burmaa Dashbal, Executive Director, Green Gold - Mongolian Rangeland Research Center and Co-Chair, International Year of Rangelands and Pastoralists (IYRP 2026) Global Alliance

Natural rangelands, which cover almost half the world's land area, play a vital role in food security, climate resilience and biodiversity preservation. The pastoral livestock production practised on those rangelands guarantees the livelihoods of some 200 million people in more than a hundred countries. In rearing cows, zebu, sheep, goats, dromedaries, camels, yaks, reindeer or llamas, pastoral communities have built up skills and practices suited to arid, semi-arid and mountain environments, based on animal mobility. However, despite its vital importance, the activity is under threat. Rangelands are being eaten away by crop farming, urbanisation and extractive industries, compounded by

**Pastoralism is not
a vestige of the past.
Quite the opposite:
it is a living model
of sustainability
and resilience.**

the effects of climate change. Moreover, although pastoralism is modern, productive and sustainable, it is often seen as archaic or marginal.

An international year for a little-known type of livestock farming

In this context, the International Year of Rangelands and Pastoralists (IYRP 2026) declared by the UN aims to recognise the global importance of pastoral systems and natural rangelands. Pastoralism is not a vestige of the past. Quite the opposite: it is a living model of sustainability and resilience. All over the world, it is the epitome of harmonious cohabitation between humans, animals and the natural spaces that are home to them. In moving with their animals in line with the seasons, pastoral livestock farmers are living proof of their unique ability to adapt to climate uncertainty and land use tensions, while restoring natural resources. But how can this little-known, often undervalued world be made more visible?

More than just an invitation to go on a trip

The Transhumance 360° immersive exhibition offers an audiovisual trip alongside five pastoral livestock farmers on four continents. From the pastures of the Sahel and Chad to the steppes of Mongolia, via the Andean plateaus of Argentina and the French mountains, it unrolls a rich patchwork of farms, landscapes and communities. Equipped with a virtual reality headset, viewers set off on much more than a journey across continents. They feel the breeze blowing across the rangelands and join the lives of the farmers. They are so close to the animals that they can hear them breathe... This is an exhilarating, unforgettable trip across time and space, given the different types of livestock farming to be discovered and the power of these farming communities, the sentinels of vast natural landscapes.

I hope this immersive exhibition will highlight the strength of pastoralism, this living culture that is vital for the future of our societies and ecosystems. ■



Argentina





Herds on top of the world



Don Pascual has been rearing llamas on the cold, arid plateaus of the Andes for more than 40 years. Building on expertise passed down the generations, he has steadily developed his farm and bought several shepherd's huts in the mountains. The herd he rears in the Argentine **Puna** comprises llamas and sheep, and he practises transhumance by means of "rotación".

Rotación, an identity under threat

Rotación is a type of short- and medium-distance mobile pastoralism relying on the alternating use of a network of shepherd's huts (called "puestos" in Spanish) and surrounding rangelands. Unlike seasonal large-scale transhumance, *rotación* involves repeated, flexible herd movements that are constantly adjusted to local conditions. With his herdsman Juan Gabriel, Don Pascual regularly moves his flocks between different huts, which each give access to "vegas", wet pastures that act like oases, fed by springs, in an arid environment. He has three *puestos* within a radius of around ten kilometres, which allows him to fine-tune herd movements depending on the state of his pastures and water availability. However, *rotación* is now under threat as a result of the rural exodus and because livestock farmers are growing older. This is exacerbated by increasing water shortages due to climate change, and economic constraints, which reduce farmers' ability to maintain several *puestos*. Helping farmers group together, improving access to markets, diversifying incomes and recognising the importance of pastoral mobility in the face of climate uncertainty are levers that should allow this ingenious system to survive.

In a nutshell

A pastoralist

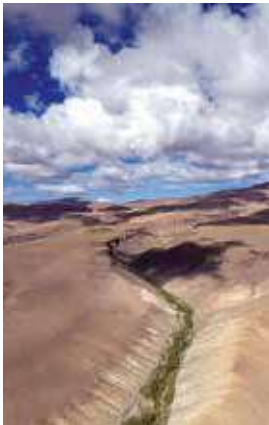
Don Pascual,
llama farmer for over
40 years in the
Argentine Puna

Animals

At the time of filming:
60 llamas, 100 sheep /
previously 300 llamas,
200 sheep

Transhumance

After leaving Antofagasta
de la Sierra (Argentina),
in the Andean Puna,
the flock travels 5 km.



Resilience and cultural identity

Llamas, the “camels of the Andes”, are central to Don Pascual’s activities: they provide wool and meat, and are part of the Puna’s cultural identity. However, things are not easy: production costs are continuing to rise, while the market for llama wool is limited and markets for meat are difficult to access. Although *rotación* is under threat, it is still a remarkable tool for adaptation and resilience. It allows pastures to rest after grazing, and makes it possible to use ecologically different sites, adjust movements in line with environmental signals (water supplies, grass regrowth, and frosts or drought), and spread the risks as regards climate uncertainty. This type of mobility also helps preserve ecosystems by limiting continuous pressure on a given site and fostering regeneration of wet pastures. For Don Pascual, preserving *rotación* means much more than just preserving a livestock production technique: “Without mobility, there would be no livestock farming here. And without livestock, the Puna would lose part of its soul” ■

PUNA

The Puna is a cold, hyper-arid steppe grassland in the Dry Andes, between 3800 and 4800 metres above sea level. Its name, which means “sleep” in Quechua, refers to the physiological difficulties of adapting to such high altitudes.

The face of transhumance



Don Pascual has been a llama farmer in the Argentine Puna for over 40 years. He inherited the family farm, and expanded by buying several shepherd’s huts in the mountains. He splits his time between the village of Antofagasta de la Sierra and his farm around 10 kilometres away. His llamas provide wool and meat, and are part of the Puna’s cultural identity. To balance the household budget, Don Pascual is also a cabinetmaker. His son Pedro, who works for a mining company and in tourism, helps out as much as he can.

Chad





From one transhumance to another



Mahamat Ismail stays in Chari department, south of N'Djamena, the Chadian capital, for most of the dry season. He lives with his wife and children in a **ferrick** set up on agricultural land, with the agreement of the sedentary communities in the area, who welcome the fact that his animals provide fertiliser. He has dromedaries, goats and sheep that benefit from the proximity to the Chari River and the surrounding rangelands.

Moving north as a family

At the start of the rainy season, when the field on which the camp is set up is due to be planted, Mahamat Ismail and his family move north, towards Kanem and Lac province. The whole family takes part in this transhumance, covering between 200 and 300 kilometres. It joins a caravan of several herds that will travel for several weeks, which includes some of Mahamat Ismail's brothers and their families. This move north helps solve issues with herd movements due to crops being planted, and gives the animals access to the Sahelian rangelands, which will stay green for two or three months, well away from agricultural zones. It also allows the herd to escape from the sucking insects found on the banks of the Logone River. After three or four months, once the northern rangelands have become too impoverished and the ponds too dry for the herds, the family moves back to the wetter Chari region. If the fields have been harvested, the family returns to the dry season camp. The animals also benefit from the zones liable to flooding along the river, which become quality grasslands once the water has receded.

In a nutshell



The face of transhumance

A pastoralist

Mahamat Ismail, son of Alhadj Ismail, camp leader, his wife and three children, and a group of Arab camel herders

Animals

Dromedaries (main herd), small ruminants (sheep and goats), and sometimes cows

Transhumance

The herd moves twice: family transhumance (Chari –Kanem/Lac), over some 500 km there and back, and the main dromedary transhumance towards Moyen Chari, totalling some 1000 km.

Over the year, they travel around 1500 km altogether.

Camel herders setting off southwards

During the dry season, some of the herders take their dromedaries south, as far as Moyen Chari province (near the town of Sahr). This Sudanian part of Chad is wetter and has many areas of grassland with trees and shrubs. This second transhumance, over almost 1000 km, only involves dromedaries and their herders. Like Mahamat Ismail and his brothers' families, several groups of Ouled Rachid Arab herders arrived in Chari department from the 1980s onwards, after fleeing the conflict in Batha region. Many herders use roads for transhumance. Staying near roads allows them to avoid crop fields and arrive more quickly in towns, which are safer and have markets. During this long transhumance, the rest of the family stays in the dry season camp with the small ruminants and cows.

Staying in the village

For several years now, Mahamat Ismail's father, Alhadj Ismail, has not accompanied his children on transhumance. He lives in the village next to the dry season camp with one of his wives and a few of his children. He grows crops in a field that he bought recently. ■

FERRICK

In Chadian Arabic, camp, or place of residence for nomads. Each ferrick is under the authority of a camp leader (the Sheikh).



Mahamat Ismail's family lives all year round in tents made from mats laid over a wooden frame, which are mobile. In June 2025, Mahamat and his wife's tent was one of a family group of five. Those five tents were part of a larger ferrick of ten tents in all.



France





Watching grass grow



COUSSOULS

Coussouls: the semi-arid ecosystem of the La Crau plain, characterised by an impermeable bedrock that prevents plant roots reaching groundwater and by vegetation suited to the dry conditions caused by the mistral.

Some of the 1500 ewes from the Merle estate in Salon-de-Provence have left the La Crau plain. In June, on these “coussouls”, the summer heat means the animals no longer have enough food. After a 250-kilometre trip in a lorry, the ewes reach the village of Entraunes, the gateway to the Mercantour National Park. In the early morning, they will walk the last 10 kilometres to the shepherd’s hut. From then on, the flock will feed solely on wild plants, and will be driven on all summer as fresh grass grows.

Summer grazing in mountain pastures contributes to sustainable pasture management. During their stay in the mountains, flocks interact with their environment. Poor management of movements or habitat damage due to overgrazing can compromise the natural cycles of vulnerable species. Conversely, good flock management on grazed areas fosters plant and animal biodiversity and controls scrub encroachment.

Sustainable mountain pasture management: a precious skill

To support management, farmers benefit from subsidies, in the form of agro-environmental and climate measures (“MAECs”), and they organise themselves to be able to manage these areas collectively. At the start of the season, Jim, the shepherd who manages the Merle estate flock, was given the grazing plan for the Sanguinière alpine pasture. He knows he will have to avoid certain zones at certain times or, conversely, graze the flock on specific resources at a specific stage of growth. MAECs are helping farmers cope with the many changes under way, changes that are having a

In a nutshell



The face of transhumance

A pastoralist

Jim, a young shepherd trained on the Merle estate (Institut Agro Montpellier – INRAE)

Jim trained as a professional transhumant sheep/cattle herder. This will be his first time as an unsupervised shepherd.

Animals

Around 600 ewes from the Merle estate

Transhumance

After leaving the La Crau plain (Salon-de-Provence, 10 m above sea level), the flock travels some 250 km by lorry, then walks the last 10 km as far as the Sanguinière alpine pasture (2000 m above sea level), in the Mercantour National Park (France).

significant impact on agropastoral livestock systems and call for new types of livestock farming that can be tailored and adapted to climate uncertainty.

Protecting flocks

Limiting animal losses is a major worry for shepherds and a real challenge for Jim, who is not yet very experienced. There are several risk factors that make it difficult to see or manage the hundreds of sheep in the flock: poor weather (storms, fog), natural obstacles (crossing ridges), isolated sub-groups or sick animals. Wolves are also a confirmed risk in the region, with several packs nearby. To reduce risks, the ewes are brought into one of the pens available on the Sanguinière alpine pasture each evening. Wolf attacks generally happen in the daytime, and cause relatively limited losses in view of the size of the flock, which nevertheless has to be counted regularly.

Working together to guarantee peaceful cohabitation

Agropastoral livestock systems provide a whole range of services in the territories where they are practised: among other things, they stop vegetation closing over and land turning to fallow, limit the risk of fire, reduce phytosanitary product or synthetic fertiliser use in cropping systems, and preserve biodiversity. However, multiple use of such areas for agropastoral livestock farming and other purposes (crop farming, the environment, recreational activities) makes it necessary to introduce coordination schemes, to allow users to live side-by-side, in a peaceful, complementary way. ■



This is Jim's first time as an unsupervised shepherd on the Sanguinière alpine pasture, in the heart of the Mercantour National Park. Once there, Jim will gradually take stock of the extent of his seasonal territory—"his mountain"—and of "his flock".

He will learn to observe the animals' behaviour, identify the experienced leaders that guide the young ewes, understand how the flock works and develop his own way of managing it. His dog will be his closest ally: it will wait for orders before herding, guiding, containing and protecting the flock.

Mongolia





The steppe, a legacy



In winter, yaks move to the mountains to graze. Young animals are kept near the camp, while non-pregnant females are left in the highlands. Yak farming is a demanding business, but as long as climate conditions are favourable, it is a rewarding one. Puljindorj Boldbaatar and his family have reared yaks and horses for three generations. They live on their ancestral lands, perpetuating a way of life anchored solidly in pastoral mobility.

Living thanks to animals

Due to rangeland degradation and a reduction in rainfall, Boldbaatar decided to reduce the size of his herd, from around 200 head to fewer than 100, plus just 50 or so horses. To avoid over-using grasslands, his family still practises seasonal nomadism: from their summer camp, they move to autumn areas and then their winter quarters in the Eight Lakes region. Their yaks provide fine wool, milk, meat and traditional dairy products that Boldbaatar and his family make and sell in their district. The soft yak underwool is exported, which allows them to buy feed supplements for their animals, clothes for the children and essential household goods. During the summer, the family boosts its income through tourism, for instance horse riding for tourists.

Strength in unity

Rangeland degradation is the result of both climate change and over-grazing, due to too many animals per herd and too many farmers on a given area of land. This has consequences for biodiversity (loss of plant diversity and increased desertification) and for wildlife habitats. The challenge is getting livestock farmers to agree on how to use rangelands and

In a nutshell

A pastoralist

Puljindorj Boldbaatar and his family belong to a group of farmers supported by the rangeland research centre (GGMRRRC).

Animals

Yaks and horses

Transhumance

After leaving Uyanga district in Övörkhangai province, Mongolia, the herd is moved several times in line with the seasons: summer, autumn, winter, and **otor**. In all, it travels around 15 km.

OTOR

Using emergency grasslands outside the usual areas in which nomadism is practised.



manage pastoral land, to reduce herd size thanks to the possibility of diversifying their sources of income from animal products (cheesemaking, dried meat, yak fibres, wool, hides, switching to selective breeding rather than fattening) and to develop other economic activities (tourism, crafts, berry and nut gathering). Boldbaatar is one of a group of farmers who have set up a communal association. They work together to sell their products, help each other to move their animals, and grow fodder crops. Regular meetings are held to discuss how to use pastures and obtain permits to access protected zones.

A love of animals

While he recognises that a pastoral life can be a hard one, particularly in the snowy, icy winters, Boldbaatar says that true farmers love their animals more than they love themselves. Spiritual values linked to nature are very close to his heart, and every spring, he and his family take part in a ritual at Lake Khovsgol, involving llamas, to protect the water and land. Respecting the environment is seen as essential: it is important not to pollute springs or move natural stones. ■



The face of transhumance



Puljindorj Boldbaatar is a Mongolian farmer from Uyanga district. His family has reared animals for three generations, particularly yaks and horses. In view of the changing climate and emerging technologies, he feels that innovations could make farmers' lives easier. However, he remains convinced of one thing: mobility, the link with grasslands and the purity of animal breeds such as Mongolian horses, which can cope with the cold, are central to the identity and resilience of pastoralism in the country.

Senegal





The school of life

During the dry season, the pastoralist and his team left the village of Bari Sine, in the agropastoral region of Fatick, to lead a hundred or so cattle to Tambacounda until the rains come. They will move to the Sahelian Ferlo zone once the rainy season starts, and spend almost three months there, until groundnut and millet harvesting has finished. The restrictions placed on livestock movements due to the fields being cultivated and the lack of room to graze animals during

the rainy season are the main reasons for moving the herd well away from the village in this hazardous transhumance.

The herd is strung out along the road down which lorries travel at breakneck speed. The cattle, whose ribs are clearly visible, walk slowly, accompanied by a few donkeys. Three of the donkeys are pulling a cart led by the **gaynakos**. Ousmane keeps a close watch on his herd: transhumance is a dangerous business.



In a nutshell

A pastoralist

Ousmane,
an agropastoralist
from the village of
Bari Sine

Animals

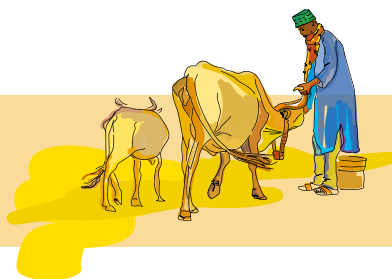
Around a hundred head
of cattle belonging to
various members of
Ousmane's family

Transhumance

After leaving
the municipality of
Niakhar, in the Fatick
region of the Senegalese
groundnut basin,
the herd takes the long
annual transhumance
route to Tambacounda.
During the rainy season
(winter), it goes to Ferlo.
In all, the herd covers
some 2500 km.

GAYNAKO

Herder, in Fula



Safety, a constant worry

Walking on the roadside is highly dangerous: some lorries do not brake soon enough and can hit the animals. Cattle thefts have also become much more common in recent years. The thieves are often armed and do not hesitate to shoot. Ousmane and those with him feel permanently unsafe. He also has to stop his herd straying into crops, to avoid conflict with the farmers. However, tensions are sometimes inevitable and can degenerate. Safety and security are now the main worry for transhumant farmers.

Less and less grazing land

Ousmane explains that if there was enough grazing land in his village, he would never leave. His main problem at present is how to feed his herd: he has to give his cattle feed supplements every morning and evening, which is expensive and time-consuming. Ousmane knows that agriculture is vital for Senegal, but has also observed that its expansion means that every year, there is less and less grazing land. In his village, rainfall has become irregular, and little by little, crops are eating into the rangelands. With population growth and increasing herd sizes, pasture is rapidly exhausted. For Ousmane, rearing livestock is the only way of making a living for families like his, who have limited access to land. He dreams of his children being able to study or to find another job, maybe overseas, to escape the hard life that transhumant farmers lead. In the meantime, he persists with that life, which requires both patience and resilience. For him, transhumance means more than just moving: it is a school of life that teaches people endurance, shows them how to observe nature, and pushes them to keep holding on in spite of hardship. ■

The face of transhumance



Ousmane is an agropastoralist from the village of Bari Sine, in the municipality of Niakhar, Nguéniène department, in the heart of the Senegalese groundnut basin. His herd, of more than a hundred head, belongs to various members of his family. Each year, he sets off with his herd towards Tambacounda, accompanied by his younger brothers and neighbours from the village, in the middle of the dry season.



Film crew



Jean-Daniel Cesaro



Anthony Francin



Tristan Parry

The Imagéo production company, which has been working with CIRAD since 2020, was responsible for all the photo, video and 360° film content for Transhumance 360°.

The content was created by Tristan Parry, director and joint manager of Imagéo, accompanied by Anthony Francin, director of photography. On the ground, they benefited from the expertise of CIRAD researcher Jean-Daniel Cesaro.

Filming, in several countries, took between three and six days depending on the context. It was facilitated by CIRAD's partners, whose grassroots knowledge and mastery of logistical factors were crucially important.

Acknowledgements

Production of Transhumance 360° was coordinated by CIRAD researchers Guillaume Duteurtre and Jean-Daniel Cesaro.

The project team wishes to thank all the partners who contributed to production:



Many people played a determining role in the project:

- in **Argentina**: Mariana Quiroga Mendiola (INTA) and Roxana Flores Laguna;
- in **France**: Fabien Starck (INRAE) and Jean-Baptiste Ménasol (Institut Agro);
- in **Mongolia**: Burmaa Dashbal (GG-MRRC) and Chris Bartels (AVSF);
- in **Senegal**: Koki Ba and Mamadou Gassama (ISRA);
- in **Chad**: Koffi Alinon (CIRAD) and Mahamat Amine (IRED);
- **editorial support**: Christian Corniaux (CIRAD);
- **financing support**: Pascal Bonnet, Corine Chaillan, Frédérique Causse (CIRAD);
- **project management support**: Alexandre Bouchot and Sandra Rullière (AFD).

Networks and projects working for pastoralism

Argentina



The film was made with the help of Mariana Quiroga Mendiola, a researcher at the National Institute of Agricultural Technology in Argentina (INTA) specialising in pastoral systems and mountain pastures in the Northwest of the country. Mariana is a founding member of PastorAmericas and co-chairs, with CIRAD, the Global Agenda for Sustainable Livestock (GASL) “Restoring Value to Grasslands” action network, supported by FAO. This international network works to secure recognition of the ecological, social and economic roles of natural grasslands on a global level.

Chad



The Institut de recherche en élevage pour le développement (IRED), based in N'Djamena, is a major scientific player in central Africa. Its work on animal health, pastoral systems and livestock production dynamics was essential in documenting the realities for pastoralists in Mandelia township in Transhumance 360°. The film made in Chad is based on the Equipe France fund project to build IRED's capacity in terms of livestock production research and analyses to boost food security in Chad, funded by the French Embassy in Chad and coordinated by IRED in partnership with CIRAD.

France



The PasAgroPas project, launched in June 2023 to run for three years, involves some 15 agropastoral livestock systems representative of seven countries around the Mediterranean. The aim is to design new forms of agropastoralism capable of coping with the challenges posed by climate change, while guaranteeing the multifunctionality of such systems within territories. It is led by the Polytechnic Institute of Bragança, in Portugal. The SELMET joint research unit is one of its partners.

Mongolia



The Nomads For Life project aims to make mobile pastoral systems in Mongolia more resilient in the face of rangeland degradation and climate change. It supports the construction of multi-stakeholder action plans, the strengthening of livestock farmers' organisations, and the diversification of sources of income. It is coordinated by Agronomes et vétérinaires sans frontières (AVSF), CIRAD and national institutions in Mongolia, and is contributing to more sustainable, productive pastoralism tailored to current challenges.

Senegal



The village of Bari Sine is a reference pastoral territory being monitored by the PPZS (Pastoralism and drylands in West Africa) platform in partnership for research and training. A study monitored 21 cows from 19 herds using GPS to model their behaviour (resting, grazing, movement). With support from the Multifunctional Landscapes project (CGIAR) and the exploratory PEPR* programme FairCarboN, the study revealed novel local practices such as individual fallow and frequent night grazing, which bear witness to the fine-tuned adjustments farmers have made in response to agro-climatic pressures.

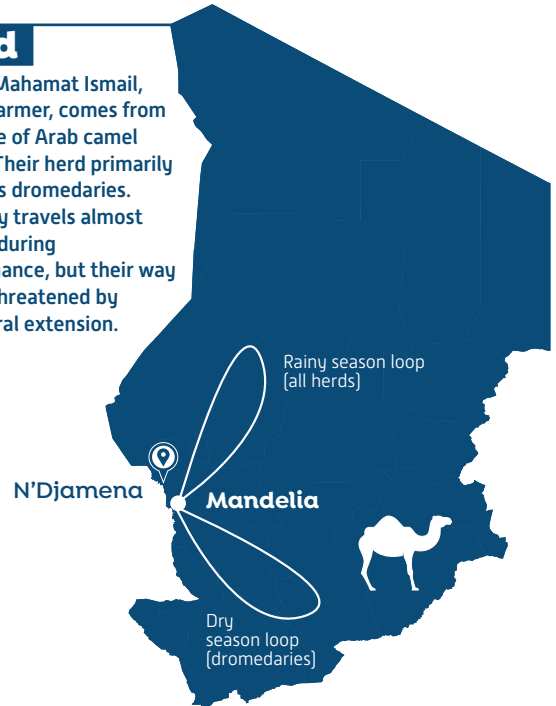
* Priority Research Programmes and Infrastructures (PEPRs) are funded under the France 2030 investment plan

Pastoralism

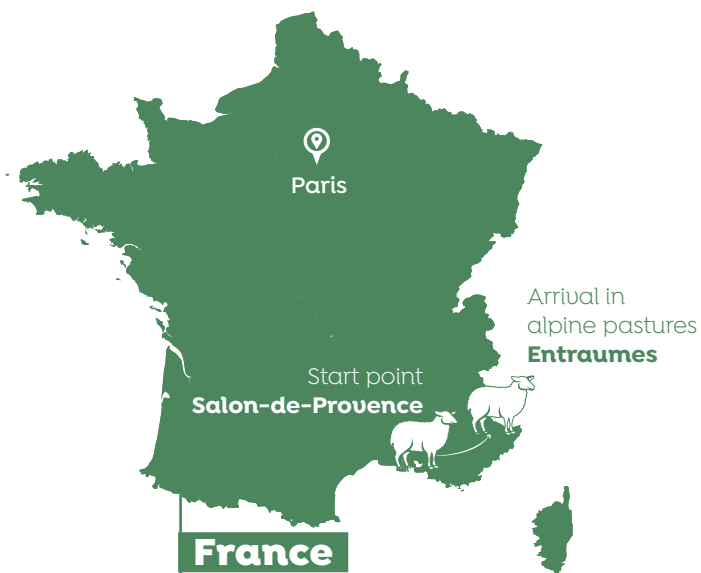


Chad

In Chad, Mahamat Ismail, a camel farmer, comes from a long line of Arab camel herders. Their herd primarily comprises dromedaries. The family travels almost 1500 km during transhumance, but their way of life is threatened by agricultural extension.



n pathways



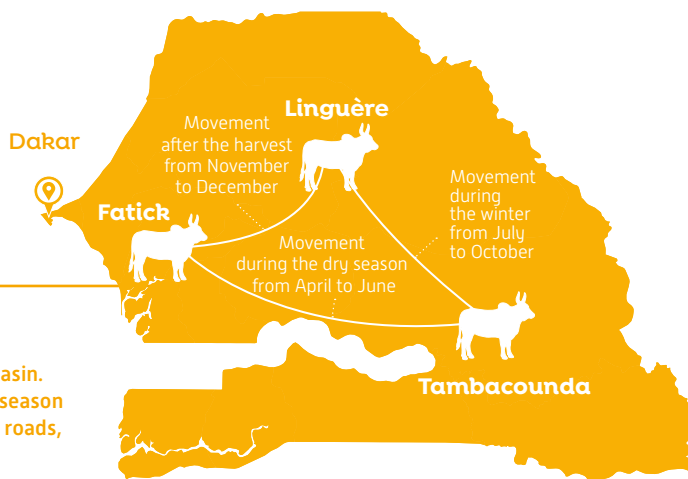
France

In France, the flocks from the Merle estate move to summer grazing zones in the Alpine pastures of the Mercantour National Park. Jim, a young shepherd, will look after the flock for three months. He will have to take care of the environment and watch out for wolf attacks.



Mongolia

In Mongolia, Boldbaatar and his family have been rearing yaks and horses in the Övörkhangai region for three generations. They move their yaks to the foothills of the mountains before the winter, to protect them from the icy winds.



Senegal

In Senegal, Ousmane is an agropastoralist in Bari Sine, a Serer village in the groundnut basin. He leaves his village halfway through the dry season to find new pasture. His team has to use main roads, which are very unsafe.



CIRAD is the French agricultural research and international cooperation organisation working for the sustainable development of tropical and Mediterranean regions. It is a national Public Industrial and Commercial Establishment (EPIC) that works with its many partners to build knowledge and solutions to guarantee resilient farming systems, protect biodiversity and promote sustainable food systems.

www.cirad.fr



AFD Group works to deliver on France's ambition to build a fairer, more sustainable future with its international partners. Its mission is to finance and support projects in the most vulnerable and middle-income countries, to combat poverty and preserve the climate, biodiversity, and global health.

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