Livestock insurance for mobile herders In West Africa:

Workshop Proceedings

Les Résidences Mamoune, Dakar, 2-3 November 2016

Transhumant herds from Burkina Faso crossing a river in northern Togo
(photo Gilles COULON/Tendance Floue for AFL, 2016)

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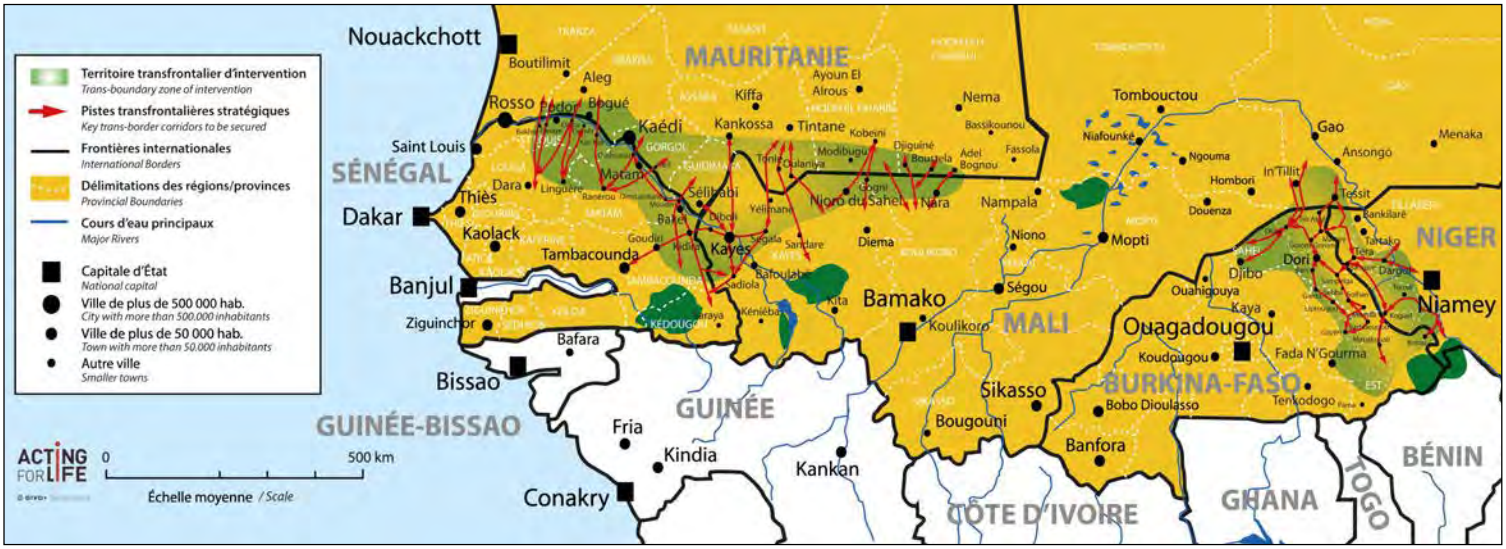
ACRONYMS

ACF-I	Action Contre la Faim International
ADENA	Association pour le Développement de Namarel et villages environnants (Sénégal)
ADID	Association pour le Développement Intégré de Dahra
AFL	Acting For Life
AGHRYMET	Centre Régional de Formation et d'Application en Météorologie et Hydrologie Opérationnelle (Niamey, Niger)
AMDE	Association Mauritanienne pour le Développement et l'Environnement
APESS	Association pour la Promotion de l'Élevage au Sahel et en Savane
ARC	African Risk Capacity
ARED	Associates in Research and Education for Development (Dakar-Senegal)
BRACED	Building Resilience and Adaptation to Climate Extremes and Disasters Programme
CFA	FCFA – also XOF West African Franc
CILSS	Comité Inter-Etats de Lutte contre la Sécheresse au Sahel (Ouagadougou)
CIMA	Conférence Interafricain des Marchés d'Assurance
CINSERE-USAID	Project of Climate Information Services to Increase Resilience and Productivity in Senegal
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CISV	Comunità Impegno Servizio Volontariato
CNAAS	Compagnie Nationale d'Assurance Agricole du Sénégal
DFID	Department for International Development
ECOWAS	Economic Community of West African States
EGAB	Entente des Groupements Associés pour le Développement à la Base (Sénégal)
EU	European Union
GNAP	Groupement National des Associations de Coopératives Pastorales (Mauritania)
IBLI	Index-Based Livestock Insurance
ILRI	International Livestock Research Institute (Nairobi, Addis-Abeba)
ISRA-BAME	Institut Sénégalais de Recherches Agricoles-Bureau d'Analyse Macro-économique
JICA	Japan International Cooperation Agency
NDVI	Normalized Differential Vegetation Index
NCG	Nordic Consulting Group (Copenhague, Danemark)
OECD	Organisation for Economic Co-operation and Development (Paris)
PRAPS	Projet Régional d'Appui au Pastoralisme au Sahel (Banque Mondiale)
PRREF	Projet de Renforcement de la Résilience de l'Économie Familiale grâce à la productivité de l'élevage dans le sud et l'est de la Mauritanie
RBM-Senegal	Réseau Billital Maroobé pour le Sénégal
RECOPA	Réseau de Communication sur le Pastoralisme (Burkina Faso)
ROPPA	Réseau des organisations paysannes et de producteurs de l'Afrique de l'Ouest
TLU	Tropical Livestock Unit

1. THE OBJECTIVES OF THE WORKSHOP

The Dakar workshop on livestock insurance is part of the implementation of the project Building Household Economic Resilience through livestock productivity in the south and east of Mauritania (*Projet de Renforcement de la Résilience de l'Économie Familiale grâce à la Productivité de l'Elevage dans le sud et l'est de la Mauritanie* - PRREF), financed by the European Union[1]. Through a co-financing mechanism – the PRREF-Mauritania is aligned with the UK-Aid BRACED program under implementation by AFL since January 2015, which also covers Mali, Niger, Burkina Faso and Senegal. As part of both interventions, "an exploratory study of microinsurance issues related to livestock in the context of trans-border mobility" was initiated in 2015, the results of which formed the basis for the present workshop.



The AFL-BRACED project is built around two major trans-boundary zones. The western territory covers strategic transhumance routes connecting southern Mauritania (Trarza, Braka, Gorgol, Guidimaka, Hodh-el-Gharbi and Hodh-el-Chargui Provinces), with north-western Mali (Kayes, Koulikoro) and Senegal (Regions of Saint-Louis, Louga, Matam, Tambacounda). The eastern zone captures important livestock movements departing from northern Mali (Gao Region), continuing to the northern and eastern regions of Burkina (Dori, Djibo, Fada N'Gourma), after intersecting with transhumance routes originating from western Niger (Tillaberi Province).

1.1 The central role of animal production in West Africa

The contribution of livestock production in the local, regional and national economies of West African countries has grown in magnitude over the past 30 years.

Livestock production systems have been commonly prominent in the north, where erratic rainfall patterns impose a natural limit to cereal production. Conversely, crop farming has mainly been done in southern regions, where diseases such as trypanosomiasis have hindered the development of livestock production, especially cattle. During most of the last century, regular exchanges between farmers and herders during seasonal transhumance movements (dairy products and manure for grain) testified to a strong economic complementarity between the two livelihood systems and have helped to form close social ties between communities.

[1] This workshop and the study on which is it based have been financed by the European Union. Any views and opinions expressed in this document are the sole responsibility of Acting for Life and do not necessarily reflect the views of the European Union.

The abundant and regular rainfall in the 1950s and 1960s marked the first turning-point, with the shift of the agricultural boundary northward, which acted as an incentive for newly installed famers to invest in livestock in order to take advantage of the open space available[2]. More toward the south, the abundance of grain production also encouraged some farming communities to invest in livestock[3].

Starting in the 1970s, and as a result of recurrent droughts, agropastoralism became also a key factor in adapting to climate risks for pastoralists. Pastoral communities invested in agricultural production in order to recover and to rebuild their herds. At the same time, the acquisition of livestock helped farmers to secure their family income in poor years and to invest their revenue from agriculture in good years. As a result, the past decades have marked a general shift of livestock systems toward the southern regions of the Sahel, which has been reflected in the growing adaptation of zebus to trypanosomiasis (sleeping sickness).

Now widely spread, agropastoral systems rely on numerous combinations between livestock and agricultural productions, constantly in search of a delicate balance between two activities that are complementary, yet also demanding in terms of labour, and which require access both to farming land and common property pastures.

The conversion of Sahelian households toward agropastoralism has had significant implications. On one hand, there are very few "pure" herders, or conversely, "pure" farmers who are just involved in one production system. On the other hand, livestock production no longer takes place only in the so-called "pastoral" north, but has also developed in southern areas, some of which have become important regions for livestock production. In Mali, the largest cattle producing regions are now located in the centre and south of the country, especially in the cotton-farming zone.

In coastal countries, recent livestock statistics have also confirmed the dominant role of ruminants in animal production[4]. Already in the 1940s, there was evidence of a progressive southward movement of Sahelian herders, pioneering new areas in countries such as Ghana, Benin and Togo. Starting in the 1970s, recurring droughts, the decline of the sleeping sickness, the regularity of transhumance between the Sahel and the Coast and the diversification of productions among local communities have continued to promote the establishment of agropastoral systems in the south that are also firmly anchored in the livestock value chain.

1.2 LIVESTOCK MOBILITY: COMMON STRATEGY FOR ALL LIVESTOCK SYSTEMS

The convergence towards agropastoralism could have triggered a process of sedentarisation and intensification of livestock production. Reality proved more complex. First of all, wherever the abundance and stability of pastoral resources allow, a relative intensification of production may have taken place[5]. However, given the climatic instability in the Sahel, intensification processes have been mostly restricted to distinct ecosystems (for instance, the Niger River Delta in Mali) or in areas rich in high-quality farming by-products (groundnut basin in Senegal, cotton-producing zones in southern Burkina and southern Mali). This type of intensification also requires inputs

[2] For instance, in Niger, a central agropastoral belt has developed during this period across the country.

[3] In Burkina, the abundance of grain production has also urged some farming communities to become agropastoralists, for instance, the Gourmanche, who in the 1950s, used to trade sorghum with the Fulani for cattle.

[4] The FAOSTAT-2104 census estimated the cattle population to 25.5 million in coastal countries (44 million in the Sahel). Even when excluding the significant portion taken up by Nigerian cattle (19 million), numbers in some coastal countries remain significant (e.g., more than 2 million cattle in Benin compared to 3.5 million in Senegal).

[5] As such, the spectacular increase of exports from Burkina of live animals between 1982 and 2001 (a 2.6 fold increase for cattle, 3.4 for sheep and 5.6 for goats) was only possible through a strong dynamic of agropastoral systems, including also the development of fattening ruminants (**FAO**, April 2014, Capitalization of Support of Development of Pastoralism in Burkina Faso).

(such as cotton cake), which remain costly[6], while the opening of the world market and a growing access to imported meat forces Sahelian producers to offer a competitive price to urban consumers in coastal countries, in order to retain their market share.

Secondly, for a large majority of agropastoralists, the mobility of the family herd has remained a basic strategy to optimise utilisation of scattered and unpredictable pastoral resources from one season or year to another. This strategy is also found even in sedentary farming systems, such as the cotton-producing zone in Mali, where depending on the size of the cattle herd, cotton producers send their animals on transhumance over long distances. Similarly, in several Sahelian regions (such as northern and eastern Burkina, northern Mali, western and central Niger), cross-border transhumance toward costal countries has become a necessity given the inter-annual variations in the level of pastoral resources, and the reduction of pastoral resources resulting from the encroachment of crop productions into the rangelands.

In a similar way, livestock mobility has also proved an essential strategy in coastal regions, with certain countries (such as Benin) having a double-transhumance system (i.e. twice in the same year). Whether at the local, regional or cross-border scale, movements of livestock during the rainy or the dry seasons are vital, clearly evidenced by the increasing diversity of itineraries, including from the south to the north or between the east and the west[7].

By allowing animals to access different types of resources (pastures and woodland), mobility helps to increase livestock productivity, to maintain the reproductive capital and to strengthen resilience during and after climate shocks. Several comparative research studies have confirmed that transhumant animals are in fact more productive than sedentary animals. Mobility also helps to optimise exchanges (whether barter or sale) with local communities in host areas and to access markets to sell animals. Now fully documented, the contribution of transhumant herders to supplying the value chain is fundamental. Moreover, in transhumant systems, mobility helps to produce meat, something of which the operators in the value chain are fully aware, taking advantage of this fact by extending the trekking time toward terminal markets in coastal countries, allowing animals to put on weight as they walk[8].

Contrary to popular opinion, mobility is also good for the environment. Contributions from research and development programmes have demonstrated the major impact of the climate factor on the productivity of natural pastures, rather than the stocking rates (number of animals). Furthermore, the interaction between livestock and vegetation ensures the stability of the herbaceous layer (dissemination and burying of seeds), as well as the regeneration of trees and shrubs (digestion of fruits by the animals). Summing up, rangeland degradation is found mostly in southern zones which are densely populated and where fragmentation of pastures around villages has forced producers to confine their herds in small areas and limit their mobility.

1.3 LIVESTOCK INSURANCE: AN EVOLVING DEBATE

Throughout the world, traditional insurance products for livestock are common, particularly for high-value animals. An animal is insured for a series of risks, of which the most common are accidental injuries or fatalities[9]. Those conventional insurance products are mostly used in the context of sedentary livestock systems, for instance in a peri-urban context.

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[6] The FAO reported that in 2014 in Burkina, the production cost of a kilogram of meat in 2014 was 720 CFA for an animal raised in a transhumant system, compared to 2,460 CFA in an intensive system (FAO, 2014, ibid).

[7] For instance, livestock herders from Nigeria entering central Benin and "pushing" Benin herders into Togo.

[8] **CORNIAUX C., THEBAUD B., GAUTIER D**., 2012, Commercial mobility of livestock between the Sahel and coastal countries: the future of trekking on-the-hoof, Nomadic Peoples, Volume 16, Issue2, 2012: 6-25.

[9] This type of insurance is currently available in Senegal, through the Compagnie Nationale d'Assurance Agricole du Sénégal (CNAAS).

Over the last 15 years, however, agricultural microinsurance has taken centre stage. This trend has been reinforced through a growing investment by governments and their development partners in adapting to climate change and in developing safety nets. In the West African context, the recent or imminent adoption of agro-sylvo-pastoral legislations by several countries (Mali, Senegal, Burkina Faso, Niger) have also spurred the implementation of social security and insurance systems to combat the risks associated with rural production. As a result, livestock insurance has drawn interest, especially in the context of livelihood systems which are highly mobile and livestock-dependent.

The increasing incidence of climate change has also placed significant stress on the importance of providing herders with safety nets that will help to reinforce the capacity of livelihood systems to absorb shocks and to recover quickly. In this context, the debate on the feasibility of index-based livestock insurance (i.e., indexed to climatic events, especially to drought) has become all the more important.

However, lessons learnt from research and development have shown that non-climate-based events (such as diseases, accidents and livestock theft) may also have a strong impact on the size of family herds, and their productivity. This observation raises the question regarding the relevant risk to be covered by insurance and the type of insurance to be developed (index-based or conventional), in order to meet properly the needs of producers.

1.4 THE RESULT OF AN INITIATIVE STARTED BY ACTING FOR LIFE IN 2015

As part of the PRREF intervention in Mauritania, "an exploratory study of microinsurance issues linked to livestock in the context of trans-border mobility" was planned as a key element of the BRACED Program. Given the complexity of the subject, it was agreed during the BRACED inception workshop in Sikasso-Mali (January 2015) to map the main issues in order to better grasp the next steps of the process. A study was therefore conducted in February-March 2015, drawing on a review of the literature related to microinsurance in general, and agricultural insurance in particular.

Given the growing popularity of index-based insurance systems, this review focused on livestock insurance in Mongolia and in northern Kenya. In addition, taking advantage of a workshop organized by BRACED in Dakar in February 2015, meetings were held with private and public stakeholders in Senegal, where index-based agricultural insurance is currently being launched along with more traditional insurance products

In April 2015, a study report was published which reviewed the lessons learnt from conventional or index-based livestock insurance products, capitalizing on the experience from interventions in Mongolia and Kenya over the past 20 years with mobile livestock herders[10].

The study highlighted the difficulty of designing a product that was properly adapted to mobile herders, while taking into consideration the particular requirements of livestock systems in West Africa and their differences compared with the systems prevailing in Mongolia and Eastern Africa.

[10] A English version of this study was completed in September 2016: Acting For Life-Nordic Consulting Group, Brigitte THEBAUD, 28 September 2016, Feasibility of index-based insurance for livestock (IBLI) in the context of the Sahel and West Africa: Framing the Issue.

Therefore, the study raised several basic issues:

- The significant investment of time and resources required for the construction of reliable indexes correlating a specific climate event (e.g., a drought) with livestock mortality rates, based on data gathering series collected over long and uninterrupted periods of time (20-30 years).

- The practical limitations involved in the close monitoring of climate data (especially rainfall), in sparsely populated Sahelian areas, often ill-equipped with meteorological stations.

- Mobility as a basic strategy to manage and mitigate climate shocks, and as a result, the necessity to call into question whether drought is THE risk to be insured.

- The importance of approaching microinsurance for the agricultural sector in the broader context of reinsurance of risk, and safety nets at the national and ECOWAS levels.

- The need to include the impacts of non-climate-related risks on livestock production systems, and also, to not dismiss too quickly the possible contributions of conventional insurance products, e.g., against livestock disease or accidents.

Subsequently, a risk analysis was implemented as part of a 5-country survey carried out at the end of 2015 in Niger, Burkina Faso, Mauritania, Mali, Senegal, among a large sample of transhumant families (386). This survey included a specific focus on non-climate-related risks. Through a co-financing mechanism, the AFL-PRREFF and the UK-Aid/BRACED projects completed a series of analysis on the potential role of livestock microinsurance products to address the risks faced by pastoral and agropastoral households in the West African context.

The AFL-BRACED/EU survey was undertaken between August and October 2015, when transhumant herders had returned to their home base, following a difficult dry season due to a disastrous rainy season (2014). Becoming available in July 2016, the results of this study[11] have provided key insight into the notion of pastoral risk within families practicing regular and seasonal mobility with their livestock, including cross-border movements.

As a result of this process, it was found that the information gathered, the elements of analysis compiled and the working hypotheses developed justified holding a workshop on the issue of microinsurance for livestock that would bring together key contact persons in the sector. This was precisely the purpose of this workshop.

2. THE WORKSHOP: ORGANISATION AND REPORTING

The official opening of the workshop was based on a series of four interventions: by Mr. Sidi Mahmoud Ismael from the Ministry of Livestock of Mauritania, El Hacen Ould Taleb (President of GNAP-Mauritania), Mr. Arnaud François (Coordinator of the Africa Agropastoralism Program at AFL) and Dr. Mamadou Ousseynou Sakho, the General Secretary of the Ministry of Livestock

[11] **Acting For Life-Nordic Consulting Group, Brigitte THEBAUD**, juillet 2016, Résiliences pastorales et agropastorales au Sahel : résultats des enquêtes 2015 et situation de référence (Sénégal, Mauritanie, Mali, Burkina Faso, Niger), en collaboration avec : Astou Diao Camara, Mouhamed Rassoul Sy (ISRA-BAM), Christian Corniaux, Jéremy Bourgoin, Tangara Pape Ousmane (CIRAD), Dakar. Etude réalisée pour le Projet de Renforcement de la Résilience de l'Economie Familiale grâce à la productivité de l'élevage dans le sud et l'est de la Mauritanie (PRREF Mauritanie) financé par l'Union européenne et pour le Projet de Renforcement de la Résilience par la Mobilité du Bétail (AFL) dans le cadre du Programme BRACED de la coopération britannique (UK-Aid).

Farming and Animal Production of Senegal. One after the other, they insisted on the importance of a debate on such a crucial issue as the protection mechanisms necessary to secure livestock production systems in West Africa, especially in the current context of climate change. Also, it was brought up that such mechanisms were perfectly in line with the Framework Laws governing the agricultural sector in several countries, such as the Agro-Sylvo-Pastoral Orientation Law in Senegal, (2004-16 of June 4, 2004), Article 8 of which establishes the formal principle of social protection of farmers and herders.

2.1 PARTICIPATION

The purpose of the workshop was to initiate an informed debate based on a common understanding of the challenges related to providing livestock insurance for mobile herders in West Africa. Therefore, the workshop brought together a large representation of private and public institutions involved in microinsurance, along with associations representing livestock producers, as well as livestock herders (see list of participants in Annex 1).

Representatives from Planet Guarantee, MANOBI (integrated information systems) and CNAAS (agricultural insurance in Senegal) highlighted the point of view of the insurance sector, while members from the Ministry of Livestock an Animal Productions of Senegal and from the Ministry of Livestock of Mauritania offered the viewpoint of Government institutions. Herders were represented through several members of professional organisations such as the Billital Maroobe Network (RBM), the Federation of Cooperative Pastoral Associations in Mauritania (GNAP), the Pastoralism Communication Network (RECOPA) in Burkina Faso and the Association for the Promotion of Livestock Farming of the Sahel and the Savanna (APESS). At the level of the CILSS, participation by the Regional Coordinator of the Regional Pastoralism Support Project in the Sahel (PRAPS-World Bank) helped to enrich the debates even further by bringing in a sub-regional perspective.

In addition, the workshop included representatives from the Mauritanian Association for Development and the Environment (AMDE), the World Food Program (WFP), the International Labour Organisation (Impact Insurance Facility-ILO), CISV-Italy, USAID (Project of Climate Information Services to Increase Resilience and Productivity in Senegal-CINSERE), the Japanese cooperation (JICA), and the European Union. The research community was represented through the participation of ISRA-BAME (Senegalese Agricultural Research Institute-Bureau of Macroeconomic Analysis) and Oussouby Toure (Senegal), pastoralist expert and consultant.

2.2 WORKING PROGRAM AND SCHEDULE

The workshop was facilitated by Brigitte Thébaud, an expert in agropastoralism (Nordic Consulting Group-AFL), with support from Samba Djibi Diallo from ARED-Dakar in managing the debates. Annex 2 contains the daily schedule of the workshop. The working program proposed ahead of time and validated at the start of the workshop followed a simple methodology. A series of four PowerPoint presentations (see Annexes 3 to 6) introduced different aspects of the issues to be debated, through a pedagogic approach promoting the gradual construction of a joint and shared vision between participants:

- The **first presentation** (see Annex 3) provided a clear picture of livestock microinsurance, with a special focus on the indexed-based insurance schemes tested for mobile herders (IBLI) in Mongolia and Kenya. This presentation also clarified a certain number of insurance mechanisms, especially index-based insurance as opposed to more conventional insurance products.

– After clarifying the basic concepts and reviewing the principal lessons learnt to date, **the second presentation** (see Annex 4) revisited the basics of livestock production in West Africa and the requirements imposed by pastoral and agropastoral systems when it comes to developing insurance products for highly mobile livestock.

– Once the specificities of West African livestock production were firmly established, **the third presentation** (see Annex 5) brought up the issues and challenges to be met as regards the introduction of index-based insurance applied to systems of mobile herding, as well as the emerging debates resulting from it.

– The **fourth presentation** (see Annex 6) shed new light on the nature of the risks incurred by mobile herders, in order to respond to two fundamental questions: is drought truly the risk to be insured above all other, and can this be done through index-based insurance? And: are there other non-climate-related risks that are as decisive, and which may be covered by conventional types of insurance?

Each presentation was followed by an open debate, allowing participants to give their points of view and argue their positions. At regular intervals, ideas deemed to be key ideas emerging from these debates were "stored away" in a "fridge" for further discussions (see Annex 7). These ideas, together with the notes taken by the AFL team during the debates, provided the basis for the synthesis chapter of this report. In addition, Annex 8 presents a reference bibliography on the subjects brought up.

2.3 Structure of the report

After explaining the context in which the workshop was organized (Part 1) and the working schedule (Part 2), Part 3 (below) summarises the content of each introductory presentation used to open the debates.

Next, rather than proceeding with an individual report of each debate, Part 4 presents a synthesis of the discussions held based on the key themes that emerged, with, when relevant, additional elements of information illustrating and supporting the discussion. This step was considered to be more pertinent than simply proceeding with separate syntheses for each individual debate. A per-segment approach would have major drawbacks. First of all, the ideas debated and the discussions held after each presentation cannot be isolated from each other due to comments and discussions overlapping between themes and between sessions. Secondly, an effort to reach a higher-level of synthesis was indispensable to take the debate on fundamental issues further.

3. SUMMARY OF THE (4) INTRODUCTORY PRESENTATIONS

3.1 Index-Based Insurance for livestock: historical background and how it works (see annex 3, 20 slides)

Microinsurance: setting and context (slide 2). The most recent studies on microinsurance confirm that, worldwide, the majority of producers bear by themselves the burden of managing risks and dealing with impacts. These studies also show that, in poor countries, without insurance to guard against risk, households generally take decisions aimed primarily at preserving the integrity of their lifestyle and, when a shock occurs, attempt to recover from it as best as possible by tapping into their social networks. However, when these networks reach their limits, the inability to transfer risk elsewhere also constitutes an additional factor of vulnerability to crises.

Microinsurance thus appears to constitute a necessary response to a virtual absence of social protection systems in many countries. Broadly speaking, microinsurance can thus be defined as a protection mechanism for individuals with low incomes against risk (accident, sickness, death in the family, natural disaster) in exchange for the payment of insurance premiums adapted to their need and the level of risk. It is mainly targeted at low-income producers in developing countries, particularly those engaged in productive activities in rural areas or in the informal sector and who are often underserved by commercial insurers and social insurance systems.[12]

In Africa, microinsurance is available through different channels: cooperatives, mutual health insurance and other community programs, non-governmental organisations (NGOs), microfinance institutions (MFIs), regulated commercial insurers and informal mechanisms such as tontines, burial societies and other support groups.

A limited market penetration of microinsurance products in the Africa (slide 3). The level of penetration of microinsurance remains weak on the African continent. In 2008, there were about 14.7 million people covered by insurance, or 2.6% of the target population. Southern and Eastern Africa dominate the microinsurance landscape with, respectively, 8.8 million and 4 million people covered. This leaves only 1.9 million people covered in Central, North and West Africa. In French-speaking countries, the widest range of products and the largest number of beneficiaries can be found in Senegal, Benin, Burkina Faso and Cameroon. Life insurance products dominate the microinsurance market.

In the last 15 years, however, agricultural microinsurance has taken centre stage. This trend has been reinforced during the last 10 years through growing investment by Governments and their development partners in adapting to climate change and in developing of safety nets. In the West African context, the recent adoption by several countries (Mali, Senegal, Burkina Faso, Niger) of agro-sylvo-pastoral legislations aiming at providing rural producers with better protection against basic risks has greatly contributed to this growing interest.

Conventional (classical) and index-based insurance (slide 4). Agricultural insurance products can be divided into two broad categories: conventional insurance and index-based insurance. Conventional (or "traditional") insurance has several advantages, but also a number of limiting factors, while index-based insurance brings with it important innovations.

Conventional insurance products (slide 5). As a general rule, private insurers prefer to sell microinsurance products to individuals, covering specific and independent risks, such as health insurance, life insurance, fire insurance and accident insurance. Products specifically designed for agricultural production are rare. They often contain many exclusions (insurance restricted to frost or hail, etc.) and are mainly targeted at commercial farms producing high value crops (such as, for example, vegetable producers in Mexico who export their products to the United States or Canada).

Adapting conventional microinsurance products to agricultural or livestock production has been facing several limiting factors. Conventional insurance carries a high "moral hazard": a farmer whose indemnity is based on crop loss may be tempted to stop investing in his production system. Equally problematic, producers who consider themselves highly risk prone will ask for higher levels of protection, leading to a general increase in insurance premiums. The high cost of insurance also comes from the need for insurance companies to assess for each producer, the damage incurred and to quantify the economic losses. This is possible in

[12] **Phily C**., 2009, Micro Insurance Innovation Facility, FANAF General Assembly, February 2009, Yamoussoukrou, Côte d'Ivoire.

the case of large agricultural operations, but unmanageable in countries where family farms are small, widely dispersed and often difficult to access. This results in high "transaction costs" which affect the annual level of premiums to be paid by producers.

In low income countries, traditional agricultural insurance would thus seem to be too costly (both for producers and insurance companies) and is certainly unworkable in practice. In fact, it is relatively rare. Even in the USA, Europe or Australia, multi-risk agricultural insurance was only achieved through state subsidies.[13]

The special features of index-based insurance (slide 6). Considered both as a support tool in cases of disaster and as a vector for development, index-based insurance has several special features.[14] It is a product linked to an index showing a strong correlation with the level of production. The insurance contract generally guarantees against specific risks or events (e.g. a hurricane, a drought, a flood). Such risks are usually defined at a regional level and the payment of compensation payouts to policy-holders is triggered when the index reaches a critical threshold.

Index-based insurance differs from conventional insurance products, for which compensation is based on an assessment of losses at the level of individual subscribers. For index-based insurance, it is rather based on the monitoring and measurement of a particular index which may be linked, for instance, to climate (such as: the amount of rain which fell during a period considered decisive for production) or to an estimate of production losses for a particular region. The compensation process is thus triggered when this index reaches a predetermined threshold.

An important principle is that all buyers pay the same premium and, in case of a disaster, all receive the same compensation. Since compensation is linked to a specific index, such as rainfall or satellite measurements of vegetation, there is no need to individually visit producers to appraise their losses (crops, livestock), which also reduces the management costs of insurance companies and, as such, the level of premiums that producers must pay. Moral hazard is also virtually eliminated, since compensation no longer depends on the performance of the producer. As such, in bad years, producers have a vested interest in trying to protect their crops: they will benefit from compensation anyway, and will be winners twice over. This results in a considerable lowering of transaction costs, all while giving insurance companies the ability to reach a large number of producers spread over a wide geographical area.

Index-based insurance has two potential benefits. On the one hand, it helps strengthen the resilience of small producers by compensating them in bad years, thus allowing them to survive a crisis and protect their assets. On the other hand, it allows them to access other opportunities in better years, for example, by giving them easier access to credit and, consequently, the ability to invest in newer and better paying technologies.

Index-based microinsurance – the requirements: covariance and basis risk (slide 7). Ideally, the index used must correspond to a high impact weather event, which has a widespread and similar effect on all producers. The correlation between the evolution of the index chosen and its effects on production levels must thus be closely established, which is called covariance. If the behaviour of two variables is observed (for example, the link between the level of rainfall and harvests), the degree of covariance indicates the extent to which these

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[13] **Greatrex H, Hansen JW, Garvin S, Diro R, Blakeley S, Le Guen M, Rao KN, Osgood, DE**. 2015. *Scaling up index insurance for smallholder farmers: Recent evidence and insights*. CCAFS Report No. 14 Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Avalable online at: www.ccafs.cgiar.org

[14] *FIDA, 2010, The Potential for Scale and Sustainability in Weather Index Insurance for Agriculture and Rural Livelihoods, by P. Hazell, J. Anderson, N. Balzer, A. Hastrup Clemmensen, U. Hess and F. Rispoli. Rome.*

two variables change simultaneously, or not. The stronger the covariance, the narrower the correlation. For example, if the index indicates a relationship between the level of rainfall and crop yields, a strong covariance means that the less rainfall there is, the lower the harvest will be, through a simultaneous movement over the entirety of the observed zone. As a result, the insured risk must also be covariant, that is to say that it must affect everyone at the same time and in the same way, for example, a drought or a flood[15]. Conversely, a low covariance means that a decrease in rainfall has only a limited and highly differentiated impact on crops, depending on the individual producers.

Index-based insurance must thus be based on an index guaranteeing a high correlation between the weather event and its impact on producers. This is the only way to avoid a basis risk, namely the potential asymmetry between payouts triggered by the index and the actual losses suffered by the insurance policy holder. With this type of insurance, the compensation is the same for all producers insured in the region. As such, it is possible that, in some years, some producers receive a compensation without having incurred any losses and, other years, incur losses without receiving any compensation. Indeed, it is possible for an individual farmer to lose his crop following a drought, but not receive any compensation because the drought was not picked up by the meteorological station used as point of reference. Finally, the variety of microclimates, the heterogeneity of the physical environment (e.g. the topography) and the diverse types of household production systems within the same geographical unit will increase the "basis risk" that is inherent in index-based insurance.

Livestock insurance: some benchmarks (slide 8). The first livestock insurance products are to be found in Japan, which introduced livestock insurance (covering in particular milk-producing animals) in 1929, ten years before introducing agricultural harvest insurance. This livestock insurance provided insurance on the lives of the animals (excluding slaughter), and to which small producers could subscribe. If a producer subscribed to the insurance, he was also required to insure all of his horses and other cattle with the nearest cooperative on which the producer depended, reinsured half to the government.[16]

Traditional insurance products covering livestock are common, particularly for high-value animals (race horses and breeding cattle, for example). An animal is insured for a series of risks, of which the most common are accidental injuries or fatalities. Like any conventional insurance, establishing a baseline is compulsory: the health status of the animal (veterinary control) and its commercial value, among others. In general, guarantees are required, particularly in terms of health monitoring and ear-tag identification of the animal. In case of disaster, the independent verification and evaluation of damages are also part of the contract. This type of insurance is currently available in Senegal, through the CNAAS.

However, in the case of extensive livestock systems deployed across large areas and subject to climate risks, conventional insurance has proven itself to be inadequate: high transaction costs, difficulties in reaching vast areas and in offering a mass insurance product.

For all of these reasons, index-based insurance has rapidly emerged as an alternative. Since the 1980s, countries such as the United States and Canada have embarked on index-based insurance. In Ontario (eastern Canada), livestock drought insurance is based on the principle that the productivity of forage crops remains closely linked to rainfall and that, in case of rainfall deficits, yield declines of between 20 to 40% were common, with no possibility to secure two hay cuts during the same season.

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[15] Source: Sara Teillard-Acting for Life.

[16] **Food and Agriculture Organisation of the United Nations**, 1966, *The Development of Agriculture in Modern Japan: the Scope of the Japanese Experience*, Study on Agricultural Planning #6.

More and more, index-based insurance implies the development of public-private partnerships, often based on the need for joint investment. For example, by improving financial services in rural areas and climate information systems, the government gives private insurers access to potential clients and facilitates the development of index-based insurance.

In addition to the government and the private insurance companies, reinsurers are another very important actor. By definition, basis risk is reduced when it comes to insuring a high covariance event. However, this implies that when such an event occurs, the insurer must have the means to compensate rapidly a large number of producers located over a vast area. In such situations, the insurer has no choice but to sell part of the risk on the international market.

Several tools are also currently being designed or tested to facilitate direct insurance with national governments for the management of climate-related disasters. For instance, ARC (Insurance Risk Capacity, through ARC Insurance Limited) was created in 2014 with WFP, DFID, the Swedish SIDA, and the Rockefeller Foundation. The facility is intended to provide index coverage to African governments in case of major climatic events. ARC started with 4 countries (Kenya, Mauritania, Niger and Senegal) and is continuing to expand to other countries (Gambia, Malawi, Mali), targeting an optimal coverage of 30 countries by 2020 for drought, floods and cyclones, with approx. 1.5 billion dollars for drought contingency plans. Each country pays an insurance premium to be able to use this coverage. The maximum coverage available is 30 million US dollars per country. Payments are triggered by an application (Africa Risk View), which quickly translates satellite data on rainfall into estimated costs. ARC was established as a special agency of the African Union, with the support of the WFP, DFID, Sweden (SIDA), IFAD and the Rockefeller Foundation. ARC is funded by DFID and KFW (Germany)[17]. The risks are transferred to international insurance and reinsurers through brokers. In order to begin operations, ARC Insurance Company was capitalized by DFID (United Kingdom) and KFW (Germany) for GBP 90 million and EUR 50 million, respectively.

Mongolia's pioneering experience (slides 9 10 12). The semi-nomadic and nomadic herders of Mongolia represent about 30% of the population of the country, with a herd estimated in 2011 at 36 million heads (all species) and whose subsistence relies mostly on communal rangelands. The country's livestock systems are unique in that they usually include all types of ruminants (camels, goats, sheep, cattle) as well as horses, whose milk is also consumed. The size of a family herd is generally large (several hundred animals).

Being a semi-arid steppe landscape, the natural environment is subjected to brutal seasonal variations, from rigorous and freezing winters to extremely dry summers. Particularly harsh winters are referred to as "*dzuds*". In early December, freezing temperatures can drop to below -25°C and are accompanied by heavy snowfall. In January and February, cold fronts from Siberia bring heavy snowstorms with temperatures down to -50°C.

Unlike a drought in the Sahel, during which herders tend to migrate south, there is no possibility in Mongolia to escape a *dzud*. Everyone is affected. *Dzuds* cause very high mortality among herds, involving significant economic losses for herders and for the national economy. In the early 2000s, a series of *dzuds* caused the death of 11 million animals. It was at this time that the Government of Mongolia and the World Bank set up an index-based livestock insurance. Since then, other *dzuds* have occurred, notably in 2008 and 2011.

[17] **DFID, Rockefeller Foundation, AU, WFP**, ARC (African Risk Capacity), Preparatory file.

In 2004, the Government adopted authorised by law an index-based livestock insurance scheme in the country and signed, the following year, a credit agreement with the World Bank to begin the Index-Based Livestock Insurance Project (IBLI). The project was later co-financed by Japan, Switzerland and Korea.

Tier-based risk coverage comparing two insurance products (slide 13). The implementation of an index-based insurance for livestock was based on an index of mortality rates, for which Mongolia had long and uninterrupted historical data, beginning in 1920. Such an index was thus more relevant than an index based on the climate itself. Its practicality was also evident, since the statistical data regularly provided by the government allowed for aggregate mortality rates at the district level. At the start of the program, the data was compiled and analysed in order to establish, for actuarial purposes, complete series for the predicted mortality of cattle, horses, camels, sheep and goats, for each district.

The system works according to three layers of risk:[18]

a. Weak risk: frequent climatic events, which have little impact. The losses incurred can be borne by the herders themselves through their own coping strategies.
b. Medium risk: less frequent climatic events with more impact. These events can potentially be insured and the risk transferred to private insurers.
c. High risk: infrequent, with high impact. These events only occur every 30 years or so. Their effects can be devastating and their magnitude requires state intervention to cover risk and manage disasters.

Given these risks, IBLI-Mongolia offers two overall insurance products:

- Livestock Risk Insurance (LRI, called Base Insurance Product during the pilot phase): a commercial product sold by private insurers at the district level. The payment of compensation is triggered when the livestock mortality rate is between 6 and 30%.
- Disaster Response Product (DRP): a safety net offered by the Government when the mortality rate exceeds 30%. It has since been replaced by the Government Catastrophic Coverage; which is only available if the herder has subscribed to the basic insurance (LRI).

At the same time, the program proceeded to implement a Livestock Insurance Indemnity Pool. This common fund mitigates relatively high risks borne by private insurers, who can pool all of the fees paid by herders until the compensation process is triggered. At that time, the pool releases the funds to each insurer in proportion to their contribution to the pool, which helps avoid default in case of problems (e.g. the bankruptcy of a private insurer). If the compensation to be paid exceeds the reserves of the pool, the government plays the role of a reinsurer, linked to a contingency mechanism (Contingency Debt Facility) funded by the World Bank.

Index-based insurance in Mongolia: the example of a herder (slide 14). In practice, the system works as follows: a herder pays a premium based on the declared value of his animals and on the level of estimated risk for the district in which he lives. The herder may choose to insure between 25 to 100% of the value of his animals, which naturally affects the level of the premium. The payment of compensation is triggered when the mortality threshold (the trigger) is reached in the district and for the insured animal species. According to the three risk levels identified above, weak risk corresponds up to 6-7% projected mortality. This is the level of risk which the herders must assume themselves. Average risk corresponds to a mortality rate between 7-30%. For the high risk (disaster level), the mortality rate exceeds 30%, which is then considered to be the "exhaustion point."

[18] **Luxbacher, Kirsten and Andrew Goodland**, 2011 World Resources Report Case Study. Building Resilience to Extreme Weather: Index-Based Livestock Insurance in Mongolia. World Resources Report, Washington DC.

For example:

> A herder has 36 sheep; whose unit value is 28,320 Tugrik (the local currency). The herder decides to insure all of his sheep for 100% of their value, or 28,320 T. x 36, equivalent to approximately 1,000,000 T. The premium that the herder has to pay (for a basic insurance trigger threshold at 7% and a 30% exhaustion point) is 1.4% of the declared value, or 14,000 T. (equivalent to approximately 3 goats).
>
> Let us suppose that, in a bad year, the mortality rate for sheep in the herder's district is 35%. The payment made through the basic insurance will be 30%-7% = 23% of 1,000,000 T., or 230,000 T. Since the death rate exceeds 30%, the Disaster Fund (DRP) will cover the additional 5%, for a payment of 50,000 T., for a grand total of 280,000 T.

The following figures are instructive:

- Between 2006 and 2010 (namely 5 consecutive years), IBLI was able to insure 3.2 million animals.
- During the 2008 *dzud*, the total amount of compensation paid to herders amounted to USD 340,000, which were paid to 1,783 herders.
- At present, 5 insurance companies participate in the program and approximately 10% of the country's herders are insured.

The northern Kenya experience from 2000 onwards (slides 15 to 19). Strongly inspired by the program set up in Mongolia, the experience gained in northern Kenya since the late 2000s is particularly relevant. Like the Sahel, northern Kenya is a region dominated by extensive mixed livestock systems (cattle, camels, and small ruminants), where mobility is also a basic management strategy, and which faces high climate variability.

However, an overly systematic parallel between northern Kenya and Sahelian countries should be avoided. In this part of East Africa, the topographic factor is more dominant (with the possibility of transhumance between high plateau areas approximately 800m above sea level and the low plains). In addition, there are two dry seasons and two rainy seasons with, consequently, different types of grazing and different production cycles. In the context of livestock insurance contracted on an annual basis, this means that the year includes two potential compensation periods. Also, herders regularly consume the blood of their animals, which is not a common practice in the Sahel.

Index-based insurance in Kenya – how it works (slide 20). Supported by a multidisciplinary team involving the ILRI (International Livestock Research Institute, Nairobi), the American Cornell University and the Basis Research Consortium, the IBLI-Kenya was initially funded by USAID. Subsequently, a number of partners were added: The Universities of California and Syracuse, the Australian National University, APA Insurance, the African Reinsurance Corporation, DFID, and the EU. Initially, the system was implemented in the Marsabit District, later extended to the Wajir and Isolo districts from 2014.

A long and complex design work allowed for the establishment of a correlation between the vegetation indices and the projected rates of livestock mortality. Satellite data allow pastures to be measured every 10 to 16 days. This data is integrated in a predictive statistical model on livestock mortality rates. When the pasture situation indicates a projected mortality rate greater than 15% of the basic threshold determined for a specific area, the insurance system compensates the insured herders from this area.

In February 2013, a review of the situation showed that 27,000 families with a total of 340,000 TLU had subscribed to the IBLI insurance package. The construction of this index required extensive and time-consuming teamwork, because unlike Mongolia, there was no series of reliable statistics on livestock mortality related to drought over a long period.

The IBLI only covers herders for livestock losses among camels, cattle, sheep and goats, resulting from drought. The contract insures the livestock for one year and includes two potential payout periods: at the end of the short and at the end of the long dry seasons. The contract contains a "trigger threshold" which is the mortality rate forecast beyond which the insurance begins to compensate the insured. Suppose, for example, that the trigger threshold is set at 15%. If the forecast mortality rate at the time of the compensation period was 35%, the insured would receive 20% (35-15%) of the value of the insured livestock.

Potential clients can only purchase this insurance during a two-month purchasing window, starting just before the rainy seasons. At this time, they are unable to predict the climatic conditions for the coming season. Otherwise, herders would not insure themselves in years anticipated to be good, which would not allow insurers to form the reserves necessary to cover losses in bad years. This point will be covered further when looking about pricing.

The system works as follows: Let us take the example of a family living in Kargi (Marsabit district) who buys insurance for 10 TLU. The contract stipulates two parameters: firstly, the compensation value of each insured TLU and, secondly, the trigger threshold for the level of the index that will activate payments. If the declared value of a TLU is 15,000 Kenyan Shillings, then the herd would be valued at 150,000 Ksh. The period covered stretches from March to February of the following year. The payable premium is 3.25% of the total insured value (150,000 Ksh), amounting to 4,875 Ksh for the whole herd. This premium is also determined by the chosen trigger threshold, which is set at 15%. The family will receive no compensation, even if there are mortalities in the herd, when remaining below this threshold. Let us now suppose that, during the following rainy season (in February), this rate rises to 25%. At that time, the family will receive a 10% compensation (25%-15%) applied to the total value of the insured TLU, or 15,000 KS (10% of 150,000 KS). All of the other herders in Kargi who have subscribed to the insurance will receive the same compensation.

3.2 THE BASIC ELEMENTS OF PASTORAL AND AGROPASTORAL PRODUCTION IN WEST AFRICA: IMPLICATIONS FOR THE DEVELOPMENT OF LIVESTOCK INSURANCE (SEE ANNEX 4, 30 SLIDES)

Livestock production: an activity that is now widespread in all of West Africa (slides 2 to 7). Well beyond the Sahelian pastoral areas, we can observe a shift of livestock production systems toward the south, especially in the cotton-producing basins (southern Mali and southwest Burkina). As a result, the numbers of livestock are now distributed throughout all the regions of the Sahelian countries, and the cattle herd has reached significantly high numbers in the centre and the south, such as in Mali, where nearly half of the cattle population is concentrated in the regions of Mopti and Sikasso.

In addition, livestock production is becoming an important component of the economy of coastal countries (22 million ruminants in 2012, compared with 34 million in the Sahel).

Finally, livestock production is now part of complex production systems, usually combining various agricultural productions and other income generating activities such as trade and transportation, plus the increasing contributions of migrants living abroad.

Production parameters applying to all systems and areas (slides 2 to 17). Despite the diversity of contexts in which livestock production takes place, a number of basic parameters are common to all areas:

- Livestock feeding relies on a wide range of resources (rangelands with natural grass, trees and shrubs), crop residues, weeds in and at the edges of cultivated fields, agro-industrial by-products (cotton seeds, cotton or groundnut cakes, etc.), household residues (e.g., millet bran) and minerals (especially salt).

- Depending on the area, the proportion of these resources may vary. In northern regions, natural pastures are key for feeding of livestock, while access to crop residue triggers southward post-harvest movements by herders, allowing them to enter into manure contracts with farmers. Conversely, in southern regions, access to agro-industrial by-products is easier, especially in cotton-producing areas. However, whether they are raised in the north or the south, ruminants require a daily ration of 6.25 kg of dry matter per TLU, without which their poly-gastric digestive system cannot function properly. Therefore, in all areas, access to natural pastures remains essential.

- Biomass supplied by natural pastures is highly dependent on rainfall, while its distribution over time and space is usually uneven. As a result, pastures are generally scattered, and disequilibrium from one year to the other may lead to significant mortality, especially in drought years. Resources are also affected by seasonal variations, which impact on the animals. During the rainy season, green pastures are rich in protein, minerals and vitamins, while straw loses its nutritional value during the dry season.

- Access to pastures depends on access to water points for drinking: surface water during the rainy season (ponds, lakes and rivers) and underground water points during the dry season (high-yielding boreholes such as those found in northern Senegal, cemented wells and traditional wells).

Livestock mobility as the cornerstone of pastoral and agropastoral livelihood systems in West Africa, both in the Sahel and in Coastal countries (slides 18 to 23). A study has shown that in the cotton-producing zone of southern Mali, livestock owners with herds of a certain size also use mobility as a strategy, sending their livestock on transhumance because there is insufficient pasture for the animals. In the same way, we can observe various seasonal movements of livestock in coastal countries. Mobility can take multiple forms and operate over a range of distances with, in some cases, major transhumance movements and, in other cases, much smaller movements within a more limited area.

Beside the climate factor, livestock mobility may also meet other imperatives. In some regions, the reduction of pastoral resources due to the expansion of farming into rangelands requires from agropastoralists seasonal movements to other regions. Conflicts and livestock diseases (or their reduction, such as the case of trypanosomiasis) are also reasons for resorting to mobility.

The AFL-BRACED/EU study carried out recently, based on a survey of 386 families, provides a detailed portrait of the transhumance in the 5 countries involved, with examples of livestock movements, including cases of cross-border transhumance. These movements were particularly intense during the pastoral year 2014-2015 following a very poor rainy season, especially in northern Senegal and southern Mauritania: movements from northern Senegal to the south (Sine Saloum and The Gambia), the southeast (eastern Senegal) and western Mali (Kayes region); movements from southern Mauritania to the north or centre of Senegal and toward western Mali.

Mobility is also essential for the livestock value chain in West Africa through the trekking on-the-hoof of livestock, as well as, or combined with, trucking of livestock to market by road. Trekking is often spread out over several months, and also helps animals to put on weight while walking, fattening-up in the pastures, which contributes to increasing the volume of meat produced.

Herd dynamics: essential elements necessary to design an insurance product (slides 24 to 28). Herds are often comprised of different animal species and are structured by sex and age. Zoo-technical studies carried out over the last decades have repeatedly established that cattle herds (especially in Fulani systems) are often made up of a 70% females to 30% males ratio, showing the priority usually given to milk production, while also confirming the link with the market, as surplus males are regularly sold off.

The natural growth rate of cattle is slow, approximately 3% per year, calculated over a 15-year period taking into account good years (when the growth rate may be higher) and bad years which will result in livestock mortalities, and a rapid decline in herd size.

If herd numbers are reduced, the reconstitution time of large livestock (cattle and camels) may be very long. However, this time is shorter for small ruminants, which reproduce more quickly, which also explains why herders often rebuild their herds after a drought with sheep and goats. Still, for cattle, reconstitution time can be significant, especially if the herd has lost a large portion of its numbers. Securing livestock assets during a crisis becomes vital. Considering the terms of exchange between livestock and cereals during and after a drought, herders who manage to save a significant number of their animals (especially males to be sold off) will be in an advantageous position. Coming out of a drought, at the start of the new harvest, the price of cereals returns to normal while the supply of animals on the markets is low because mortality and sales were high during the drought. Therefore, the price of livestock goes back up and remains high for a long time, especially for large stock. As a result, herders that managed to save their cattle are in a strong economic position. By selling a limited number of animals, they are able to secure a large volume of cereals and thus relieve pressure on their herds (e.g. milk production can be dedicated to young animals rather than having to be used for family consumption).

Balance between herd size and family size: a key element to target herders to be insured (slide 29). By definition, microinsurance for livestock should profit to herders whose livelihoods may be significantly affected by risks. As a result, the definition of a poverty (or viability) threshold is essential, based on the equilibrium between the herd size and the family. Within livelihood systems that depend largely on livestock, human and animal demography are closely intertwined. The balance between herd-size and family-size is critical to reduce vulnerability, to allow for preparedness to a drought and to enable rapid recovery. Herders need to draw on their herd's milk and meat production, and use some animals as currency in exchange for grain and other products. Eventually, a minimum number of animals owned will be absolutely necessary to sustain the livelihood of the family.

Studies conducted first in East Africa, and later in West Africa in the 1980s, demonstrate that there is a minimal number of Tropical Livestock Units (TLU) necessary per person to ensure its economic viability of the family in the Sahel. Below that level, the household becomes more vulnerable in the event of a drought. The size and structure of the herd (species, sex, age class) reflect directly the level of resilience before, during and after the climatic event. Using empirical herd structure and reproduction parameters, daily human calorie requirements, along with milk and cereal availability, a ratio of 3 TLU per person in the family (with an equivalence of 0.75 person for children over 12) is to be considered as a poverty threshold. Over the past 30 years, this norm has been widely used in Sahelian countries.

In an agropastoral economy integrating multiple elements (which may include cash crops such as cotton), the standard 3 TLU cannot be applied because the contribution from agriculture would impact directly on the level of household food self-sufficiency, while allowing transfer of investments between these two activities. Thus, a loss of animals during a poor year would be quickly made up through farming income invested in the purchase of livestock, resulting in quicker recovery-capacity after a crisis. In the 1980s and 1990s, several research studies (especially in northern Senegal and in Burkina) highlighted the fact that in agropastoral systems where the contribution of agriculture is significant, a threshold of 1.5 TLU per (adult) person in a family is a realistic poverty threshold. More recently, a study on resilience in dry zones carried out jointly by the World Bank, the FAO, CGIAR and African Risk Capacity arrived at more or less the same ratios: a pastoral threshold of 3.5 TLU per person and an agropastoral threshold of 1.7 TLU.

The implications for the design of a livestock insurance product (slide 30). Livestock insurance should be approached within increasingly complex livelihood systems, integrating other productive and income generating activities: agriculture, commerce and livestock trading, artisanal gold mining, migration abroad. As a basic element, insurance should also protect against risks encountered by animals on the move. During pastoral movements (such as seasonal transhumance), livestock is subject to high risk of rapid loss in animal numbers (epidemics, drought), while the reconstitution rate is slow, especially for large stock. This results in a delicate balance between the size of the herd and the size of the family, which will determine the threshold of viability (poverty) to be maintained in the event of a crisis.

3.3 Issues and challenges linked to the introduction of index-based livestock insurance in West Africa (see Annex 5, 16 slides)

Constructing the index: important requirements that need to be met when constructing an index-based insurance (slide 2). The construction of a climate index has to meet two major requirements: on one hand, the availability of a permanent system which monitors climate and its impact on primary production (rangelands), and on the other hand, the existence of a reliable correlation, strongly covariant, between the climate factor and herd mortality rates, by species and by zone.

Monitoring the climate factor and its complexity (slides 3 to 10). An initial difficulty has to do with the prevalence of volatile climate situations from year to year, especially in the context of climate change. The 2014 rainy season was characterized by significant fodder deficits in Sahelian countries, especially in the western parts (northern Senegal and southern Mauritania), as clearly shown by the biomass estimates made at the end of the rainy season (October 2014). The biomass production in Senegal was uneven, with production tapering off gradually northward. The southern part had a significant surplus, especially in Casamance and near Tambacounda. In the centre of the country, fodder deficits were minor or moderate. However, the north was in a situation of severe deficit, especially in the areas around Podor and Matam, as well as on the border with Mauritania. In Mauritania, fodder production was generally poor in the entire area to the east of the border at Trarza, in belts that reached up to 40 kilometres in width. Apart from the surpluses north of Hodh el Gharbi, there was a deficit in the entire south of the country. The regions of Brakna and Gorgol also showed severe deficits: Kaedi, in Gorgol (-36%), Bababe in Brakna (-60%). Faced with this situation, movement toward the south was possible, but the regions of Matam and Podor in northern Senegal were themselves in a situation of acute deficit. This situation was in sharp contrast with the following rainy season of 2015, which was marked by an abundance of pasture along with good distribution of grazing resources throughout the zone, especially in northern Senegal.

The second difficulty results from inter-annual variations in rainfall which frequently translate into "drought pockets", rather than by wide-spread droughts affecting whole regions. However, for producers living in these micro-areas, this is indeed a situation of crisis. Niger is a case in point, where annual assessments of fodder deficits per region are available. The results of the assessments carried out between 2000 and 2013 clearly show the regular recurrence of drought in some areas, as well as the fact that such droughts can sometimes become chronic. Over a period of 14 consecutive years, it is apparent that all regions of the country have experienced at least five years of drought. Some of them have even been in a chronic deficit situation (such as in the Diffa Region, with annual deficits over the last 11 years). These dry spells can be localized to one or more regions, and may sometimes be national in scope, as in 2004, 2008, 2009, 2011 and 2013.

The third difficulty stems from the current limited capacities of the systems for monitoring rainfall and biomass, especially in pastoral areas. Satellite data often has to be complemented with ground-truthing data. The rainfall measuring network is often lacking, as are meteorological stations. This results in a lack of (reliable) statistics, which may constitute a significant limitation for insurers.

The assessment of biomass available to livestock must also include contributions from grasslands, trees and shrubs, as well as crop residues, agro-industrial by-products and additional biomass provided by pastoral enclaves in southern areas. In this context, satellite data face a number of obstacles in order to assess the nature, quantity and quality of food resources for livestock. Complementary analyses are therefore necessary (transects, field data, monitoring of test sites), and likely to prove costly.

These elements are fundamental to understand in order to underpin debates on basis risk: which level of basis risk is acceptable for the insurer but also for the herder in order to guarantee motivation to continue with the insurance? What does it cost to improve the calculation of the index and to reduce the basis risk?

The correlation between herd and climate: a link that is even more difficult to establish since mobility is a fundamental mitigating factor (slides 11 to 13). In addition to the difficulties of obtaining climate data that accounts for the diversity of all feed resources for livestock, the correlation between the climate and predicted mortality rates remains difficult to establish. In West Africa, there are no long-term data series of statistics correlating rainfall, biomass and mortality rates per species and at a decentralised level, as could be done in Mongolia and Kenya. Also, impacts at grass-roots level may vary considerably, depending on the unequal distribution of drought-pockets in a given area, and the availability (or lack) of crop residues. Furthermore, mobility constitutes an essential factor to mitigate drought, which helps to considerably reduce the (potential) impact of climate risks. In Senegal, following a rainy season in 2014 with high biomass deficits, herders in the north travelled in large numbers toward the south, with their cattle. In the end, herd size diminished by only 2 to 3% (including sales), a negligible reduction compared to a drought situation with no possibility of mobility, where mortality rates can go up to 70%. Mobility thus helped to save both the family herds as well as national herd. However, mobility toward the south involves other risks, including other types of climate risks (e.g., flooding, off-season rains), raising the question as to whether it is better to insure climate risks around the home base or in hosting areas visited during the transhumance. Finally, it should be noted that physical, economic and social heterogeneity characterizes impact scenarios, meaning that the basis risk remains high.

Impacts of livestock insurance on livelihood systems and poverty reduction (slides 14 to 16). Among other challenges currently under debate, are the issue of the high cost of designing climate indexes, training requirements and the dissemination costs of marketing these insurance products. Also, in targeted countries, we can still observe low adherence rates of livestock producers to index-based insurance. The impact on poverty is also up for debate. On this basis, a careful review of the IBLI's impact in Kenya was conducted in 2014, from which 4 scenarios clearly emerge:

- For the poorest households, whose herd sizes are well below the critical herd size threshold, IBLI's contribution to the household economy is minimal. Coverage in case of a bad year may improve the situation, for instance insurance payment increasing the household's capacity to purchase fodder supplements on the market. However, payment of a premium year after year will end up decreasing the herd size, thus pushing further downward the vulnerability of the household. Since households in this cohort converge to the low-level equilibrium with or without insurance, IBLI offers them relatively little in the way of economic relief. Other instruments are better suited to meet their needs.
- Those households whose herd sizes are just marginally above the herd threshold expect to grow their herds if the season is good and if they do not pay the insurance premium. For these households, paying the insurance premium may actually drop them below the threshold. Consequently, IBLI can have adverse consequences to herd growth dynamics for this subpopulation.
- Vulnerable households are those whose herd sizes are modestly above, but still vulnerable to the risk of falling below, the critical herd threshold. IBLI can protect vulnerable households from falling below the poverty trap threshold in the wake of adverse insured shocks. IBLI can thus offer especially favourable dynamic impacts by keeping the household on its herd growth trajectory.
- For the non-poor households with herd sizes so large that even without insurance they are not expected to fall below the critical herd threshold after covariate shocks, IBLI would not alter their herd dynamics, just as was the case with the first group (with the smallest herds).

In short, the growth dynamics of a herd is not linear and requires time. The initial situation is thus absolutely crucial. If a herder does not have a surplus of livestock capital above the critical threshold, which allows him to pay insurance premiums year after year without impacting negatively on the growth of his herd, he stands to benefit. For all other situations, either insurance carries with it the risk that it will have the opposite effect (for moderately to highly vulnerable households), or has little utility (for affluent households).

In the end, basic questions remain unanswered. For example, is it preferable to insure producers or national governments when dealing with natural disasters? Is drought really a risk that can be covered by an insurance?

3.4 A DIFFERENT PERSPECTIVE ON THE RISKS FACED BY MOBILE HERDERS (SEE ANNEX 6, 29 SLIDES)

The AFL-BRACED project and the survey carried out in 2015 (slides 1 to 5). The AFL-BRACED project is built around two major trans-boundary zones. The western territory covers strategic transhumance routes connecting southern Mauritania (Trarza, Braka, Gorgol, Guidimaka, Hodh-el-Gharbi and Hodh-el-Chargui Provinces), with northwestern Mali (Kayes, Koulikoro) and Senegal (regions of Saint-Louis, Louga, Matam, Tambacounda). The eastern zone captures important livestock movements departing from northern Mali, continuing to the northern and eastern regions of Burkina (Dori, Djibo, Fada N'Gourma), after intersecting with transhumance routes originating from western Niger (Tillaberi Province).

As part of its design, the project planned on monitoring several resilience indicators (e.g., animal sales, the size of the herd compared to the size of the family) with a large sample of transhumant households from the 5 countries involved. However, it was agreed to expand the scope of the survey in order to provide quantitative and qualitative data about the magnitude of animal movements and on the transhumance process, taking the example of the 2014-2015 transhumance as the baseline. The study eventually included 386 families and 131 women, with the total number of livestock taking part in the transhumance of 39,501 cattle, 47,310 sheep and 15,736 goats (with approximately 1,000 camels). The survey took place from August to October 2015, at a time when most transhumant herders had returned to their home bases. The questionnaires dealt with a series of themes, with an important part of the survey dealing with the impact of livestock diseases and other risks faced during transhumance. Data collected proved to be an essential input for facilitating a discussion on the feasibility of livestock insurance. In addition to the support from the UK-Aid AFL-BRACED project, the survey was co-financed with contributions from the European Union (PRREF Project), notably for the interviews done in Mauritania, Senegal and western Mali.

Significant findings related to other risks faced beside drought and the impacts of these (slides 6 to 14). The results of the AFL-BRACED/EU survey highlighted a number of key findings:

- As indicated above, the overall number of livestock taking part in the transhumance under the management of the 386 families surveyed was made up of: 39,501 cattle, 47,310 sheep and 15,736 goats.

- The numbers involved were generally high, especially for herders originating from the drought-stricken northern Senegal, which resulted in herders leaving with almost the whole of their herd. There was still a certain number of livestock left behind in the home base, but in significantly lower numbers.

- Livestock mobility is both a fundamental survival strategy in poor years and a production strategy, as illustrated in the slide which shows transhumant movements, leaving from Burkina and from Niger, heading toward the coastal countries (Benin and Togo).

- The transhumance journeys can extend over long periods of time, often cross borders, with multiple hosting areas on the way out, and on the way back. Thus, out of the 386 families surveyed, nearly half of the transhumance journeys crossed an international border (this was especially the case for herds coming from northern Mali, Burkina and western Niger heading toward coastal countries). The average duration for the 2014-2015 transhumance was between 5 and 7.5 months, with 4 to 15 hosting areas visited by each family. Also, transhumance journeys tend to extend more and more toward the south. For example, in Togo, transhumant herders from Burkina Faso and Niger head toward the region of Bassar and the Central Region. Farther south, one can find many local herders as well as transhumant herders who come from Ghana, Benin and Nigeria.

- Mobile herders are subject to a multitude of risks, most of which are not climate-related, such as broken-down boreholes, accidents on the road, livestock theft, and diseases, some of which would tend to fall under the scope of more conventional insurance products.

An analysis of the frequency and impact of the risks incurred (slides 15 to 23). In total, 11 risks were pre-identified, for the most part corresponding with the types of risks which could potentially be covered as a standard (conventional) insurance product:

- Injuries
- Predators
- Bush fires
- Flooding
- Broken boreholes and broken motor pumps
- Snake bites
- Road accidents
- Off-season rains
- Livestock theft
- Drowning

And, added to this list, the risks associated with livestock diseases.

For each risk encountered during the transhumance of 2014/2015, the critical information gathered related to the total number of animals lost whether through livestock mortality, slaughtered for immediate consumption or as emergency sales to butchers. Even if emergency sales are not a direct loss, as such, these sales are still considered to be a significant reduction in income, as the animal is sold very cheaply.

Out of a total of 39,501 transhumant cattle, 47,310 sheep and 15,736 goats, the total number of animals that were lost due to incidents (all risks taken together) was:

– 3,342 cattle (1,799 of which lost due to diseases),

– 5,261 sheep (2,715 of which lost due to diseases),

– 3,712 goats (1,160 of which lost due to diseases).

Beside diseases (in top position), the order of frequency of the risks as compared to the number of households affected clearly show the significance of predators (236 families, or 61%), injury (181 families, or 47%), livestock theft (177 families, or 46%) and snake bites (171 families, or 44%).

All zones through which the transhumants pass are affected, including for less frequent risks that one would rather expect to be confined to certain regions. Thus, broken-down boreholes affect northern Burkina as much (if not more) as Senegal, northern Mali or Mauritania. However, this is a clearly less frequent risk for families in eastern Burkina or western Niger, whose transhumance takes them toward coastal countries where they may have easier access to surface water. Even though they are less frequent, off-season rainfall, road accidents and drowning are also risks impacting on the herd.

In the end, the impact on livestock numbers is significant, even more so since risks associated with diseases have not yet taken into account. The effects of predators appear clearly while the numbers also confirm the significance in terms of numbers of losses due to stock theft (both large and small stock). At the level of a single family-herd, these losses may have a tremendous impact, especially if the initial herd-size is already small. For a large herd, losses would be easier to recover from by simply reconstituting the herd. However, if the herd is already small, especially as regards the numbers of large livestock, losses would take much longer to absorb and recover from.

At the same time, the impact of diseases on family herd is also pivotal. Whenever diseases result in the need for urgent sales, the downward effect on the sale price of the animal is considerable. Sales usually take place in the bush where the herders are camped with their animals (bought by *dioulas* – small-scale livestock traders) or sold directly to butchers, but at a low price. (See slide 21, which gives an example of a herder from Mauritania). For the three dominant species (cattle, sheep and goats – the number of camels recorded during the survey was very small), the impact of mortality, slaughtering or emergency sales on herd numbers leaving on transhumance is high: 4.6% of cattle, 5.8% of sheep and 7.4% of goats.

The rate for animals affected by disease during transhumance is around 20% of all animal species. However, the survival rate is still relatively high in all areas, except in northern Mali (Gao region), where the impact of poor rains in 2014 combined with the difficulties in accessing animal health services appears clearly. For cattle, this rate is particularly high in herds from eastern Burkina where transhumant herders have a better access to quality drugs. The importance of being able to access animal health services is very clear.

In the end, if we add the losses resulting from other risks, the final impact on herd size is high: 8.5% for cattle, 11.9% for sheep and 23.5% for goats.

Although the rate of loss is high with small ruminants (especially for goats), the impact on the herd is often short term due to the capacity of small ruminants to reconstitute their numbers rapidly. However, the recorded mortality rate of 8.5% for cattle is high. Based on an maximum acceptable annual "off-take rate" (market sales and family consumption for meat) of about 12% established by researchers for cattle herds in the Sahel (beyond which the herd demography may be at risk), declared losses during the survey (diseases and other risks) have already accounted for 70% of that off-take rate.

These numbers put into perspective the magnitude of losses to be absorbed during a transhumance and the importance of placing livestock insurance in the context of all of the risks incurred in systems of mobile livestock production. We are also far from a drought-related index-based insurance system, and it is therefore important to address the possible role of conventional insurance products that would cover risks other than those related to climate.

In this context, and to conclude this last presentation, an exercise was carried out in order to reflect on the possible cost of such conventional insurance systems and on the ability of herders to finance them by themselves.

Insurance tariff scenarios for conventional insurance covering different combinations of risks: the logic behind the calculations and the financial implications for herders (slides 24 to 29). In the case of index-based insurance, all insurance subscribers receive the same level of compensation as soon as the triggering threshold of the index is reached. In other words, as indicated above, this is a type of insurance that will cover risks affecting all insurance subscribers at the same time, for instance, climate-related risks or endemic risks. In order to be able to cover for all losses, the insurer must therefore build up sufficient reserves from the annual premiums paid. In order for these reserves to be sufficient, the risk must therefore occur at a low frequency. Should the insurance provider's reserves not be sufficient to compensate all insurance holders (e.g., if it is a risk that occurs every 5 years on average, but if the insurer has only constituted 2 years of reserve), the insurer should be in a position to transfer a portion of the risk to a reinsurer.

In the case of independent and frequent risks (e.g., accidents), the logic is different. Since this risk may occur every year, the insurer is not in a position to constitute a financial reserve over several years. In this case, the principle of risk pooling (mutualisation) applies. This principle consists of distributing the cost of the risk between the members of a group that are potentially subject to the same risk, which may strike any one of them. That way, at the individual level, there may be years where you will receive nothing because there have been no losses, but your premium will help to pay for the losses occurring to other insured members. Conversely, there may be years where you will receive compensation higher than the amount of the annual premium if you are affected. In this case, the premiums from other insured members who have not been affected (or who have been less affected) will be used to cover your compensation.

At the level of the group being insured, for the insurance provider, the accounts need to balance, i.e., the total amount of the insurance premiums paid by the herders must equal the amount repaid to them for all reported losses; known as the "pure premium". In reality, the premium paid by the insured member will be higher because the insurance provider must also plan on a profit margin that will cover management costs and a security margin.

In slides 24 to 26, an exercise was done calculating the amount of the premium necessary depending on pre-defined compensation amounts. To do this, the average (livestock) mortality rate observed during the period covered by the AFL-BRACED/UE study was used. This is a theoretical and simplified exercise in order to better visualise the way a conventional insurance product would work. In practice, we would have to analyse mortality behaviour over several years and on a much larger number of animals in order to deduce a statistically valid average mortality rate.

Given the diversity of the risks recorded, several pricing structure scenarios were calculated in relation to insurance premiums to be paid:

- **Scenario 1**: Pricing based on the loss of livestock resulting from all the risks recorded above, but excluding livestock diseases, with the insured risks being: injury, bushfire, flooding, predators, broken-down boreholes, snake bites, road accidents, off-season rainfall, livestock theft and drowning.

- **Scenario 2**: Pricing including diseases but excluding stock theft due to its frequency and given that this is a risk that would be difficult to insure against, with the risks insured being: disease, injury, bushfire, flooding, predators, broken-down boreholes, snake bites, road accidents, unseasonable rainfall and drowning.

- **Scenario 3:** Comparative pricing isolating, on one hand, livestock theft, and on the other hand, insuring all other risks including theft and disease, with the insured risks being: disease, injury, bushfire, flooding, predators, broken-down boreholes, snake bites, road accidents, unseasonable rainfall, stock theft and drowning.

In each scenario, the calculation was based on the following parameters derived from the AFL-BRACED/EU survey data:

- Total numbers leaving on transhumance (per species),

- Total number of animals affected per species using the rate (%) of losses reported during the survey period,

– The amount of compensation paid to the herder for each animal (depending on the species), and using as reference the scale used by the CNAAS in Senegal (80,000 CFA per cattle, 12,000 CFA per sheep) and by inference, 120,000 CFA per camel, 8,000 CFA per goat. It should be noted that the CNAAS compensates 80% of the value of the animal affected by a loss, with this value being assessed for each insured animal. In cases where contracts are linked to the purchase of livestock feed by transhumant herders (recent pilot experience conducted by CNAAS), the value of one cattle was set at 100,000 CFA and 15,000 CFA for one sheep.

– The total amount to be paid to the herders (as compensation) for all animal losses must imperatively (as a pure premium) be at least equal to the amount of the premiums paid for all animals covered by the survey.

In addition, a simulation exercise was also introduced, taking the cases of 3 transhumant families surveyed, considering the size of their herd, the losses incurred, what they should have paid as a premium and what they could have received as compensation. The conclusion is that every case is unique. Depending on the rate of losses and the size of the herd on departure, they may come out winning or losing in any given year (slides 27 to 29).

To summarise:

- Slides 24 to 26 provide an overview of the sample group, with all of the premiums paid by all herders covering all compensation paid out for every animal affected. We can deduce from this the premium per species, which will respect this overall equilibrium (keeping in mind that this is a theoretical exercise with no statistical value). This implies that if we increase the amount paid out per occurrence (e.g., 120,000 CFA for a cattle instead of 80,000 CFA), the premium will have to be higher in order to cover this increase while keeping the overall balance.
- Slides 27 to 29 provide an overview at the individual level. The herder pays the premium calculated previously for each animal of his herd and only receives compensation if one or several of his animals is lost. As a result, the compensation received by the herder may be lower or higher than the amount of the premium paid.

4. SUMMARY OF THE DEBATES: THE BASIC ISSUES

As indicated in the introduction, it was deemed preferable to draw up a single overall synthesis of all the discussions held during the workshop. In some cases, depending on the nature of the subject being debated, information has been added in order to add value to the discussion.

4.1 THE NECESSITY OF AN INTEGRATED APPROACH FOR LIVESTOCK INSURANCE

It is easy (and therefore tempting) to approach livestock insurance as an isolated element, only dealing with the animals in the herd, and without considering the close and dynamic relationships that exist between herds, resources and families. Thus, we should not dissociate the climate factor (drought) from other risks incurred (e.g., diseases), or from the human element. For instance, in a livestock production system, can we really dissociate livestock diseases from human health issues? Moreover, in some countries, the risk of being injured or killed is also incurred by transhumant herders themselves, which should lead to a reflection about types of life insurance packages that may be offered to them. Nor do we find insurance packages (such as civil liability coverage) that would compensate for the costs generated by conflicts relating to livestock trespassing onto cultivated fields. Therefore, we should ask ourselves: is it truly possible to insure only animals without insuring the herder himself?

We must also closely examine the conditions in which herders access resources. For example, for a transhumant herder going to Benin, the conditions in which he may stay in a hosting area, and the difficulties he may incur (finding accommodation, facing potential conflict with farmers) are as crucial as a climate situation in his home base, which he easily managed to mitigate by being mobile with his animals.

In the same way, livestock losses due to fodder shortages or diseases are largely determined by the ability of herders to access animal health care (vaccinations, parasite removal, quality drugs) or livestock feed while they are on the move. Access to basic services is therefore an essential aspect in assessing risks by insurers, and as a result, in establishing the level of the premiums. The possibility of transhumant herders being able to manage risks related to animal health at all times, through access to professionals and quality drugs, makes risks easier to insure, and ultimately less costly to cover.

To summarise, as a specific insurance product, livestock insurance must imperatively be part of an overall vision of "pastoral risk". This should encompass a global integrated strategy to manage risk that must be applicable at different levels, but also provide coverage according to separate (risk) segments that are still related to each other. This brings up the question of the choice of where should the focus for investment lie. On one hand, a preventative treatment of risks will help to minimize the impact of crises, based on anticipating these risks (early alert), on improved services (e.g., human and animal health) or on facilitating cross-border mobility.

On the other hand, curative measures (especially through microinsurance) may prove useful for risks whose scope may surpass the management abilities of herders. However, by definition, these curative measures will be in effect only after the crisis, without any possibility of avoiding losses. In the end, everything may come back to a necessary yet delicate dosage between pre- and post-crisis treatment, at different levels of intervention (insurers, reinsurers, governments, supranational mechanisms) resulting in a hybrid system that combines comparative advantages from each mode of intervention. As such, the insurance mechanism of ARC is interesting. It allows for rapid intervention in order to limit the effects of a crisis (e.g., distribution of animal feed) instead of compensating for the consequences of a crisis (e.g., once the animals have died).

4.2 Potential difficulties in constructing a reliable index in the context of West Africa

The availability of reliable statistics is still an important limiting factor in West Africa. However, as the representatives from the insurance sector repeatedly insisted: "in order to insure, we have to calculate risks, and as a result, insurers absolutely need to have statistics."

The nature of indexes is also a fundamental question. If an index-based insurance covers drought, it would be "difficult to make this index because often, there are pockets of drought in areas that are too small to justify a triggering threshold."

For index-based agricultural insurance in Senegal, rainfall can be accounted for in relatively small areas. However, even in this case, it is still difficult to completely escape from the variability of parameters at the micro-local scale. Furthermore, even though the index-based system in place can help to limit the impact of localised rainfall deficits on agricultural production, the problem still remains in the context of livestock systems, where mobility plays a compensatory role when dealing with these deficits, but where other types of potential risks emerge as a result of the decision to move.

With regard to assessing biomass in the context of index-based insurance, satellite data is useful, but not sufficient. The quality of the fodder resources must be taken into account and we must also include other components necessary for livestock nutrition beside grasslands: such as, trees and shrubs, crop residues, access to pastoral enclaves in the south, availability and access to livestock feed. Being mobile, herders have access to a wide range of resources, and the fodder balance should also integrate all the contributions of agricultural by-products: rich residues such as cowpea and groundnut toppings, bulk fodder such as millet and sorghum stems. To this should be added the contribution provided by by-products from grain production (bran) which comprise an important supplement for strategic animals within the family herd (animals being fattened or lactating females, for example). Finally, the calculation must include additional contributions from livestock feed (wheat bran, oil cake, cottonseed).

Across the Sahel, Niger is one of the rare countries that carry out an assessment as complete as possible every year of the agropastoral situation, in order to draw up a detailed biomass estimate. Regarding fodder biomass in pastoral areas, data is gathered from observation sites on the ground by proceeding with a double sample. Using ground-truthing techniques (measuring fodder production along transects), technicians make an estimate of the fodder contribution provided by forested and shrubby enclaves in agropastoral and agricultural areas, as well as by fallow land. In addition to natural fodder, an assessment is made of the contribution from post-harvest crop residue as well as the availability of agro-industrial by-products for the following months (cottonseed, wheat bran, oil cake). Still, the final report remains theoretical in a given area because, in addition to the mobility of the livestock remaining in the area or leaving for transhumance, it is difficult to take into account the numbers of livestock coming from the outside and passing through. Furthermore, even in a good year, fodder resources are never uniform, and at the regional scale, there are always micro-areas with deficits[19].

Pastoral risk should also be examined in the context of the transformation of pastoral areas. Over the past 50 years, the availability of fodder has been considerably reduced, not because of the climate, but because of agriculture expansion into the rangelands. The reduction of rangelands in the north and pasture areas in agropastoral and agricultural regions is considerable. As a result, the mobility of pastoralists and agropastoralists is often triggered more by a lack of resources in areas where they are based than by a climate event. For the herder, the risk is therefore not the climate, but rather the expansion rate of agriculture. In some regions, the progress of agricultural clearing on rangelands can thus result in an increase of transhumance journeys, a lengthening of the distance travelled and a growing number of animals leaving.

The development of livestock farming systems in agropastoral and agricultural areas, as well as the close interaction between cropping and the natural rangelands in several Sahelian regions make it intricate to reliably interpret NDVI data, since pastoral biomass is difficult to separate from cultivated biomass, which is not accessible to animals. Added to this is the difficulty of taking into account the proportion of woody products (leaves, pods, etc.) in animal feed, which is still an essential component of their diet, especially during the dry season. It is therefore important to rely also on the climate and environmental monitoring done by the herders themselves, and therefore "to call upon their expertise." This is even more important since

[19] Thus, the campaign report drawn up for the region of Tillaberi (in western Niger) after an excellent rainy season in 2015 shows that out of the 17 sites monitored (including enclaves in agropastoral and agricultural areas), 11 of them had good production of biomass (over 1 ton of dry material per hectare), 2 sites had average production (between 700 and 900kg). This production was acceptable in two other sites (between 400 and 600kg) and mediocre in three sites (under 400 kg); Republic of Niger, Region of Tillaberi, Regional Directorate of Livestock Farming, November 2015, Report on the Pastoral Campaign 2015-2016.

appreciations may vary. A situation deemed to be satisfactory following an interpretation of satellite data may be contradicted by the assessment in the field by herders, who take into account other factors: distribution of ponds, quality of grass, etc.

These constraints will sooner or later call into question the reliability of the index, as well as the question of the basis risk and its level of acceptability both by insurers and by the herders themselves. If the basis risk is not considered acceptable, the design of an alternative index covering all types of resources would remain extremely complex. And even if it were technically feasible, the cost of this adjustment would need to be thoroughly assessed. This is an important point because if the basis risk is considered to be too high by herders, they will refuse to re-subscribe to the insurance product. Furthermore, it is essential to properly estimate the costs in developing an index because this comes down to the question of the order of priority given to interventions: should these funds be put up for the development of an index or rather to support other strategies, for instance risk-prevention measures such as supporting mobility? Moreover, this kind of index would not facilitate the understanding of the insurance system by herders or their buying into the insurance product proposed to them.

Resorting to measuring vegetation also raises other questions. The production of biomass essentially depends on rainfall, but the distribution of rain over time and space is crucial. There is always high variability of precipitation recorded over a given area and, as a result, of pasture resources, even over distances as short as a few kilometres. Similar annual precipitations may therefore generate very different productions of biomass. Precipitation may also be inversely proportionate to the nutritional value of grass cover. High precipitation will produce abundant biomass. However, beyond a certain threshold, nutritional value begins to decline due to the dilution of nutritional elements and the lignification of plant stems. Therefore, a very rainy year does not automatically signify a good pastoral year for herders. In the end, the starting conditions of the rainy season, the duration of this rainy season, as well as dry episodes, are all elements that will determine the biomass available to livestock in the rangelands.

Beyond the difficulties relating to assessing available biomass, we must also be able to establish a reliable correlation between the availability of biomass and the predicted mortality rates that may result from it. To do this, we must have detailed statistical bases (per species), at a decentralized level and over a long period. The difficulties encountered in Kenya are a good example of the significant challenges that may have to be met for West Africa. Unlike Mongolia, in Kenya, there was no series of reliable statistics on livestock mortality. Instead fragmented data drawn from various projects implemented over the years in the northern parts of the country had to be used. Still, this data was not sufficient to construct a reliable index establishing a close correlation between the indexes of vegetation and predictions of livestock mortality rates. Between 2000 and 2008, the experimental IBLI program integrated a set of additional data resulting from surveys carried out in the context of two projects (by UNESCO and the World Bank), which had recorded the monthly livestock mortality rate between 2000 and 2008. In addition, other surveys were carried out with pastoral households by the IBLI team. This was thus a long and costly operation.

In this context, it is interesting to recall that in the framework of an overall mechanism for managing disasters such as ARC (African Risk Capacity, see Section 3.1, slide 8), the index used relies solely on the measurement of rainfall, without attempting to establish a correlation with specific parameters of pastoral production (predicted mortality rate) or agricultural production (production levels and volumes harvested). This index applies to drought, flooding and hurricanes at the countrywide level, while it is simple enough (measuring only rainfall) to trigger quickly a compensation process as soon as a threshold is reached and before high losses are incurred.

Finally, in mobile systems, the nature of risk changes according to the route taken. The herder may be confronted with a risk of drought in his home base, which may later turn into a risk of floods once he arrives in the south. Other types of risk may also be manifested differently from one location to another. Thus, the risks of livestock theft or disease may be higher in coastal countries. The question of the duration of travel, and conversely, periods of immobility along the transhumance routes are also significant. In cases (which were reported frequently in the AFL-BRACED/EU study) where herders visit several hosting areas for very variable durations, what basis should be used to calculate compensation, if a drought is reported in one of these areas?

4.3 THE SUB-REGIONAL DIMENSION AND THE ROLE OF GOVERNMENTS

Sooner or later, a discrepancy may exist between a social approach that would resort to subsidies and involvement from governments, and the commercial reality of the insurance sector. Beyond dealing with disaster situations (including climatic), the insurance market relies on a necessary pragmatism: "which sales strategy should be taken? What premium and compensation rates should be applied?"

On one hand, "livestock production is a private endeavour," in which normally the government should not intervene. On the other hand, its involvement is unavoidable if only through the formulation of policy, public investment and the indispensable role fulfilled by legislators to pass laws and regulations. But above all, the necessity of government involvement resides in the fact that insuring livestock or securing agropastoral systems implies a necessary investment in securing the (national) production base, in the value chain and, as a result, in the economic growth of the country.

On the other hand, it is necessary to remain realistic. Governments have limited resources, and depending more and more on the private sector is unavoidable. The same pragmatism is required insofar as the roles of sub-regional institutions, such as ECOWAS, and the issue of West African economic integration. As some participants from the private sector noted, "even insurance for vehicles poses problems when you go from one country to another."

Especially in cases of disasters, governments must play a role that should normally be assigned to them through safety nets, insurance and reinsurance systems or supra-national mechanisms, such as ARC. Also, even outside of livestock insurance, the government should strengthen its contribution in anticipating and preventing crises, through the facilitation of mobility, animal health and livestock feed. Its role in research, training, information, awareness and statistical data is fundamental, as well as in the regulation of insurance products. At a high level, governments should highlight the economic interest of livestock mobility and transhumance, since livestock is a fundamental factor in regional integration. Thus, inter-country cooperation, lobbying carried out by producer organisations (APESS, ROPPA, RBM) and the support provided by ECOWAS remain essential elements in preserving livestock mobility between the Sahel and coastal countries.

In the end, any insurance product should be a "plus" to be added to the various elements of an overall strategy to manage risks in the livestock production sector and to protect livestock assets, both for the families involved and for governments, which have every interest in preserving the national herd.

The exercise carried out at the end of the workshop in working groups on the question of the choice of investment (if a budget were available, what should be invested?) showed the importance of mediation between different types of involvement, always favouring diversity rather than betting on a single strategy (e.g., insurance): necessity to preserve and secure

mobility, livestock insurance coming in only as a complement, crisis prevention and management (information systems and action plans), setting up funds for disasters in order to manage crises surpassing the abilities of the insurance system, favouring conventional versus index-based insurance products.

As a consequence, the role of the government appears just as clearly: involvement in high-level reinsurance, a safety net and management of disasters, promoting insurance products and controlling their quality, information to herders and their professional organisations, establishing reliable and regularly updated statistics, facilitation of mobility and all measures to anticipate and prevent crises, cooperation with other governments within ECOWAS, and in particular, collaboration with coastal countries that receive Sahelian transhumant herders.

In the same way, professional organisations should be able to fulfil strategic functions: the role of oversight, lobbying decision-makers and development partners, coordination and support of the dialogue between herders and insurers, monitoring and evaluation of the performance of insurance products being put in place.

The dimension of anticipating and preventing crises then becomes crucial. Although mobility is the best way to manage climate risks and to reduce their impact on livestock, it is even more important to facilitate this mobility by all means possible, because it helps to save livestock, while an insurance system (no matter how efficient) would only intervene after the crisis, once the animals have died. Following this same logic, ARC has striven to construct a simple index matching the quick compensation conditions set by governments, thus allowing them to intervene quickly, for example, by distributing livestock feed on a wide-scale, in crisis situations. To is perfectly in line with the basic principle followed by herders: leaving quickly during a crisis to save as many animals as possible and, subsequently, to reconstitute the herd faster. ARC therefore complements this mobility strategy in the event of a major drought and allows for intervention before the crisis has any dramatic consequences, such as the loss of livestock.

4.4 THE USEFULNESS OF LIVESTOCK INSURANCE AND ITS IMPACT ON POVERTY

This is a fundamental question raised repeatedly during debates. Whether conventional or index-based, is livestock insurance truly useful for herders?

Herder representatives highlighted several times that mobility has, at all times, allowed herders to manage several risks, and that in the end, "the best insurance for a herder is to be able to remain mobile and to safely go to other regions or even other countries, away from his home base."

This question also raises the importance of examining possible alternatives in terms of investment efficiency. For example, in the context of highly limited financial resources, is it more "profitable" for a government to subsidize an index-based insurance program than to invest in securing mobility, improving access to basic services (animal health, livestock feed), and contributing to safety nets at the sub-regional level? The question of the role of mediation within this context was also raised.

The impacts on the herders' livelihood systems also need to be considered. Depending on their position above or below the poverty threshold (family-herd ratio), are we sure that the impact is systematically positive? The practical examples provided in relation to pricing insurance cost and assessing potential gains to the herder, show that some may gain and some may lose. Still, in the case of conventional insurance and for multiple risks, the premiums to be paid are still high at the individual level, especially since they usually have to be paid every year.

This impact of livestock insurance on poverty is essential and very often links back to the diversity of situations encountered at the individual producer level. In one case, for example, it is not profitable for a herder to take out very expensive insurance for long periods because it may lead to poverty, rather than helping him to get out of it (often referred to as the "poverty trap"). In another case, "a herder did not leave this year on a transhumance journey due to a lack of labour, but because of a lack of pasture around the home base, he lost half of his herd; if he had had livestock insurance, would this have encouraged him to leave anyway, and thereby save most of his herd?" Indeed, therein lies one of the difficulties of index-based insurance: the basis risk would be more manageable in production systems where all herders live in the same geographical area (where they would never leave) and would all have identical herds. But this is not at all the reality in the field.

For some, "livestock insurance may be the worst way to fight against poverty." For others, the question of poverty thresholds remains unsolved, including for index-based livestock insurance. In some cases, one might attempt to work around the difficulty by creating a product that integrates from the start information on the level of vulnerability of the family, for example by constructing an index related to off-take rates (marketing). However, it would imply establishing and from then on constantly updating a vast database at household level, which is inconceivable at the scale of an entire country. In the end, even in cases of index-based agricultural insurance, "we realize that sometimes, it is the intermediary classes of producers that are insured above all; those who are vulnerable do not have the means and those who are richer do not really need it."

This inevitably comes down to the scenarios of conventional insurance based on the AFL-BRACED/EU survey (refer to Annex 6, slides 27 to 29), which use as a calculation basis the situation of three transhumant families in 2014-2015, each of them having experienced specific losses of animals. In these scenarios, Herder 1 loses out. Herder 2, who is in a precarious situation (Djiby Demba Ba, with a ratio of 2 TLU/person) is shown as being better off as a result: for a premium paid of 264,373 CFA, he would receive compensation of 652,000 CFA, which may have largely improved his situation by allowing him to buy other animals and to prevent his small herd from shrinking even further. The result is the same for Herder 3. However, the premium to pay every year is high, for risks that may differ from year to year. Furthermore, Herder 3 is a very rich herder whose herd size is sufficiently large to allow for quick reconstitution, even in the event of significant losses. For him, is insurance really that necessary?

To avoid the situations encountered in the context of Kenya and to be able to really target the herders who would benefit the most, while avoiding both the poorest and richest herders, we would need to have an accurate and constantly updated picture of the economic situation of every household. This would entail considerable work that would be difficult to carry out in practice.

The tables on the following page present the three examples mentioned above.

Transhumant herder 1

The example of Ablaye Diallo who went on transhumance with 173 cattle, 220 sheep and 110 goats

	Total number of transhumant animals	Total losses	% losses	Compensation rate per animal (contract)	Premium to be paid per animal	Compensation paid-out for animal lost	Total premium to be paid for the transhumant herd
Cattle	173	6	3,5%	80 000	2 366	480 000	409 233
Sheep	220	15	6,8%	12 000	1 290	180 000	283 871
Goats	110	0	0%	8 000	586	0	64 507
	503	**21**	**4,2%**			**660 000**	**757 611**

Family-herd at 2,62 TLU/person (above the 1,7 TLU poverty threshold) + significant agricultural production (millet, maize, cowpeas, groundnuts, rice)

Losses: 6 injuries (cattle) + 15 lost to predators (sheep)

Transhumant herder 2

The example of Djiby Demba Ba who went on transhumance with 173 cattle, 140 sheep and 50 goats

	Total number of transhumant animals	Total losses	% losses	Compensation rate per animal (contract)	Premium to be paid per animal	Compensation paid-out for animal lost	Total premium to be paid for the transhumant herd
Cattle	23	5	21,7%	80 000	2 366	400 000	54 407
Sheep	140	19	13,6%	12 000	1 290	228 000	180 645
Goats	50	3	6,%	8 000	586	24 000	29 321
	213	**27**	**12,7%**			**652 000**	**264 373**

Family-herd ratio at 2 TLU/person (below the 3,5 TLU poverty threshold) + no agricultural production but involved in livestock trading

5 injuries (cattle) + 21 lost to predators (19 sheep + 2 goats) + 1 snake bite (goat)

Transhumant herder 3

The example of Mamadou Ndiaye who went on transhumance with 500 cattle, 100 sheep and 50 goats

	Total number of transhumant animals	Total losses	% losses	Compensation rate per animal (contract)	Premium to be paid per animal	Compensation paid-out for animal lost	Total premium to be paid for the transhumant herd
Cattle	500	21	4,2%	80 000	2 366	1 680 000	1 182 755
Sheep	100	**25**	45%	12 000	1 290	300 000	129 032
Goats	50	11	32%	8 000	586	88 000	29 321
	650	**82**	**12,6%**			**2 068 000**	**1 341 109**

Family-herd ratio at 11 TLU/person (well above the 1,7 poverty threshold) + significant agricultural production + commerce and livestock trading + migration remittances

20 injuries (16 cattle + 3 sheep + 1 goat) + 31 lost to predators (1 cattle + 20 sheep + 10 goats) + 6 snake bites (4 cattle + 2 sheep)

Even in situations of potential gains in one year, the constraint remains of having to pay a premium that may be high, year after year. As a result, the level of this premium must match the overall budget of the transhumance: is the amount of the premium negligible, or difficult to bear? By examining the expenses incurred by families, the AFL-BRACED/EU study provides crucial information. The average budget per household for the 2014-2015 transhumance was about 1,265 million CFA. To be more specific, the profile of the 3 herders from RBM-Senegal taken as cases studies for our exercise shows the following results:

Herder	Number leaving on transhum.	Premium due for entire herd (in CFA)	Total transhumance expenses (2014-2015)	Premium as a % of transh. budget	Livestock sales and sale rate	Revenue from sale	Difference
1. Ablaye Diallo	173 cattle 220 sheep 110 goats	**757,611**	**1,052,300**	**72%**	3 cattle (2%) 7 sheep (3%)	**427,500**	**624,800**
2. Djibi Demba Ba	23 cattle 140 sheep 50 goats	**264,373**	**2,173,400**	**12%**	11 cattle (48%) 7 sheep (29%) 20 goats (40%)	**2,748,000**	**574,600**
3. Mamadou Ndiaye	500 cattle 100 sheep 50 goats	**1,341,109**	**2,190,000**	**61%**	8 cattle (2%) 15 sheep (15%) 5 goats (10%)	**1,940,000**	**-250,000**

In two cases (1 and 2), the differential from the sale of the livestock during the transhumance (once all expenses were covered) is positive, but only sufficient in one case to cover the insurance premium (case 2). In the last case (3), with a negative differential, the sale of livestock would not cover the cost of the insurance.

For Herders 1 and 3, the amount of the premium would have represented a very high percentage of their transhumance budget and would have significantly cut into their financial profit, vital when returning from the transhumance, to cover costs such as: buying grain for the family, livestock vaccination, school fees for children, etc.

Financing for the premium could have been done by increasing livestock sales, but a limit would have to be imposed sooner or later. In addition to transhumance sales, there are costs incurred for the herd kept at home during the transhumance, and additional animals are sold after returning from transhumance. However, in at least one case (Herder 2), the level of sales during the transhumance already far surpassed the acceptable offtake rate for the year, with nearly half of the number of cattle sold, and between 30 and 40% of small ruminants.

In other words, the idea that herders can easily assume the cost of expensive insurance "by selling just a few animals more every year" should be approached with great caution.

The alternative that would consist of cutting expenses during the transhumance offers few advantages for the herder. The AFL-BRACED/EU study shows that the largest expenditures are for animal health, family food, and livestock feed (oil cake, cottonseed). Such basic types of expenses are difficult to decrease, as imposing restrictions on the budget for animal health or livestock feed would translate directly into loss of livestock.

These situations lead to two observations. For insurers, the insurance system should be based on the principle that member herders will pay insurance premiums every year with no interruptions. This continuity in payment will eventually allow for a lower level of premiums to be paid as a result of better pooling of the risk. For herders, confidence in the insurance product and in its financial and economic interest are necessary prerequisites for the overall success of the operation.

To the insurer, membership by herders is an even more crucial issue for index-based insurance. Indeed, if herders do not sign up every year, it is difficult for the insurer to build reserves of funds during the good years when there will be no compensation payments to be made. It is important to remember that in cases of index-based insurance, insurers build up their reserves year after year in order to be able to pay out in the year when a significant crisis takes place (unlike in conventional insurance, which covers common and frequent risks and where premiums during the year pay for losses incurred during that same year). However, both in Kenya and Mongolia, experience shows that herder membership still tends to default, especially when a series of good years becomes a factor of demotivation. Such an observation can also be applied on a larger scale. Following the significantly low rainfall in 2014-2015, ARC (African Risk Capacity) paid out about USD 26 million in 2015 to three countries (Senegal, Niger, Mauritania), with these same countries paying premiums of USD 8 million for drought coverage. While the profits made by these governments is evident, the ARC insurance mechanism can only last over time if the contribution of governments is also maintained over time, even in years of relative abundance, as was the case in 2015-2016 and 2016-2017.

4.5 WHICH RISK TO INSURE?

This question turned out to be fundamental during the discussions. In the context of livestock production systems that turn to be increasingly mobile, many of the risks incurred have nothing to do with rainfall. In fact, "is drought really THE risk to cover?"

This also raises the question of knowing whether the design and marketing of livestock insurance products should follow a supply-based or a demand-based approach.

In addition, is it even possible to insure against every risk? Is every risk insurable? The insurance logic tends to start with the principle of a dead animal, no matter the cause of death. Its application remains complex, because if we can be covered for any risk, the type of each risk will end up determining the level of the premium to be paid, which may be exorbitant. For instance, in order to be covered, livestock theft would have to be accompanied by draconian conditions, for example, constant surveillance of all animals when out grazing and locking them up at night in secured enclosures. These conditions would be difficult to meet for transhumant herders, without which the premium would increase astronomically all while accompanied by various limiting clauses (e.g., a predetermined number of persons tending the herd, without which the loss would not be compensated). Similarly, insurance against road accidents usually comes down to civil liability, a domain generally not covered by microinsurance. As for conflicts related to incursions of livestock into agricultural fields, insurance would include a very high moral risk since some of these incursions may be deliberate rather than accidental.

A conventional and fully comprehensive insurance package thus remains complex to design, and is most likely very costly in the context of mobile livestock herders. Different risks can be added, but depending on the nature of each risk, the premium to be paid may be high and the contract may also contain exclusions and exceptions. In time, civil liability may need to be included, since the law obliges reparation for damage caused to a third party (e.g., conflict with a farmer over land resulting in crop losses). Aspects relating to social protection and health (health or life insurance) may be also part of the package.

But it is necessary to proceed in stages. In the same way, especially in the case of conventional insurance, an entire herd can be insured depending on a value corresponding to whatever the insured party may want. But first, it is better to insure only a portion of the herd (especially the portion including the strategic core) in order to build a capital of trust with herders.

Although this approach is a pragmatic one, it may also encounter limitations in cases of transhumant herds. It is true that livestock herders tend to focus their efforts on preserving a strategic core of animals in a crisis. This usually includes adult reproductive females. In order for a post-crisis herd to remain viable, they must also ensure that the youngest age classes are also represented and that they have enough males to sell. However, insurance that cover only a portion of the herd is difficult to apply due to the risk of anti-selection that can result from this: a herder may decide, as a priority, to insure animals he already deems to be weakened or vulnerable. Faced with certain risks, not all animals are equal, especially when it comes to diseases. For example, with calves, the mortality rates are generally high in the first year and tend to drop off gradually as the animal becomes an adult. Unless the level of the insurance premium is adapted to every type of animal (and excluding the contract management issues for the insurer), the application of an average premium would end up falsifying calculations for the insurer. This would then lead to an increase in the premium to protect against the risk of anti-selection or would have to include clauses in the contract prohibiting, for instance, insuring calves in their first year, or adding a deductible for the compensation for these animals. Therefore, the ideal remains to insure the entire herd without distinction in order also to prevent situations that would tend to discourage membership by herders, when an incident (e.g., lightning) strikes an animal that was not insured.

Also to be noted, are the difficulties and sizeable costs involved in implementing conventional insurance products covering animals which are constantly on the move, for instance: how to verify claims of animal loss or accident? Who assesses the animals and who follows them as they move, in order to verify an incident? These constraints could be met in time through the gradual introduction of new technologies, for instance by using identification microchips or mobile telephones to manage subscriptions and declare losses, through the use of special applications.

4.6 THE MOBILITY OF RISKS AND LOSSES: AN ESSENTIAL ASPECT

Livestock mobility is the keystone to animal production systems throughout West Africa, including in southern areas of Sahelian countries, and even farther south, in coastal countries.

Therefore, insurance products need to take into consideration "the mobility of risks, and consequently, of losses" which is not an easy task. Cross-border mobility requires the insurance sector to develop national schemes that can be integrated into sub-regional and intercommunity agreements. This a long-term task. Thus, during the 2014-2015 dry season in Senegal, it was necessary to bring livestock feed into the southern regions where herders from the north had taken refuge, because of the drought.

This is where the entire issue of the "portability" of risks needs to be raised, i.e., the maintenance of insurance coverage when moving across (international) borders. In a cross-border context, agreements between local insurers and governments are thus indispensable, but remain insufficient. Indeed, the CIMA treaty (Inter-African Conference of Insurance Markets), which established an integrated organisation of insurance in African states was not adopted by all countries[20] (notably, by Mauritania).

Although the political agenda for homogenisation is present and noted in the evolution of the CIMA code, namely through the inclusion of a section specifically focused on microinsurance (which, for instance, authorizes the development of index-based insurance), still, there is considerable political work that needs to be done. In parallel, many technical aspects need to be clarified, and in particular, the portability of risks in cases of cross-border transhumance.

4.7 LIVESTOCK HERDERS: A DIFFICULT PUBLIC TO REACH

It has been said that "neither farmers nor herders truly believe in insurance. First, you need to demonstrate what good it does, but this involves many prerequisites." In order to convince livestock herders to sign up for insurance, it must be demonstrated that livestock insurance is a worthwhile element in a risk-management strategy. But this implies that the insurance product effectively targets the risks that remain difficult to mitigate for herders despite all their experience. Thus, mobility has long allowed herders to manage the spectrum of frequent risks they are facing, as well as the risk of climate instability. Furthermore, this puts into perspective any potential interest that herders may have in acquiring drought insurance, while many other risks may seem to him to be more important. It is more difficult for a transhumant herder to care for his animals (or for himself), especially once he crosses borders.

Many practical aspects also remain to be resolved in conventional insurance: "herders find it difficult to see the benefits of insurance packages designed for agricultural because the pastoral environment is different; you need a veterinary to record and assess an insurance claim, which is a constraint and carries a cost."

In the same way as a scientific assessment of the climate should also rely on herder's practical knowledge and experience, designing livestock insurance should take into account built-in insurance systems against losses, such as transfer of animals within family and kinship groups.

The way that an insurance product is structured is also significant both for index-based insurance (the experiment in Kenya showed the high cost of raising awareness, in distributing and selling insurance) and conventional insurance. It is difficult for an insurer to meet with (and convince) every herder individually. Linkages need to be built that give an expanded role to professional organisations to communicate with the herders that they represent. However, in the end, it is necessary not only to reach out to a critical mass of herders, but also to convince them to buy insurance, year after year. For some participants involved in index-based agricultural insurance, "people may actually understand what index-based insurance is and how it works, but they are not necessarily convinced that is useful for them."

4.8 CONVENTIONAL OR INDEX-BASED LIVESTOCK INSURANCE?

This was one of the most fundamental questions raised during the discussions. Generally speaking, the observation was that index-based insurance related to the climate and most specifically to drought situations, would not be necessarily the most appropriate response to the

[20] Including Benin, Burkina Faso, Cameroon, Central African Republic, the Congo, Ivory Coast, Gabon, Mali, Niger, Senegal, Chad, Togo, Equatorial Guinea and Comoros

needs of mobile herders in West Africa. It was considered that this type of insurance still raises a number of unanswered questions: what is required in order to calculate a reliable index? Is there really an interest in the product, whether it be from herders or from the private insurance sector? How to design a livestock insurance product (or package) in the context of cross-border mobility? Who should pay for the insurance, considering the multiple actors involved in the management of a single herd?

Index-based insurance may pose problems with herders signing up, especially if it is focused on climate risks (e.g., wide-scale drought) that may not occur often. Also, faced with increasing livestock mobility, most of the risks incurred during a cross-border transhumance (diseases, road accidents, livestock theft) have little to do with climate. And although climate should be taken into consideration when constructing an index, it should be debated whether it would not be preferable to take as point of reference the situations prevailing to the south, in the hosting zones, rather than in the home territories, from where the transhumance start (e.g., insuring against flooding in coastal countries, rather than drought around the home base).

The management of basis risks is also a difficult problem to resolve, especially in pastoral and agropastoral contexts characterized by extreme heterogeneity of situations and impacts. Knowing how to construct an index is one thing, but it then needs to be applied to mobile livestock that will sooner or later move out of the geographical zone where the index applies. For example, in Senegal, an index applicable to the region of Kaolak will not necessarily be valid in Tambacounda, and even less so in the countries to the south. This is a complex question from a point of view of defining the probability of risks.

Furthermore, should index-based insurance be systematically rejected or are there no other adaptations possible in the West African context? Conversely, what options are offered by conventional insurance? In theory, "what is insured is livestock mortality, no matter the cause." However, it is not certain that all risks are insurable, especially those whose probability is high every year (e.g., livestock theft) or those that may result from negligence (e.g., losses due to boreholes breaking down as a result of poor management of the infrastructure). The coverage of such risks would involve very high premiums or the contractual obligation of accepting major exclusions. Ideally, a fully comprehensive insurance package should be developed, but the cost of premium would be very high, and not all risks are insurable.

The configuration specific to each country involved also needs to be taken into consideration. Eastern Burkina experiences years where rainfall is poor; but that does not necessarily have the same acute characteristics of a drought as those seen in Niger or in northern Mali. However, the reduction of pastoral rangelands following the expansion of cultivated land is a much more limiting factor to livestock production, which means that even in good years, the number of agropastoralists must leave on transhumance toward the coastal countries. In such a context, index-based insurance based on climate would make little sense. On the other hand, in countries such as Mauritania, the risk of a wide-scale drought is real, and, unlike Sahelian regions located near the coastal countries, alternative refuge areas for Mauritanian herders are more limited.

It is also important to consider a fundamental principle: index-based insurance is characterized by relatively low premiums, with as a result compensation pay-outs which are also low. This is therefore a product designed to reach the masses. Conversely, conventional insurance is more targeted and individualized (one herder, certain animals). The premium is often higher, but the compensation is higher as well. These are therefore relatively different products. Still, in the perspective of reaching a wide audience, one objective must prevail: "to design an insurance product with a cost that is as low as possible."

Also, index-based insurance works on a pluri-annual basis, with the financial reserve being constituted over the course of several years. For this reason, it is preferable to insure a single risk with a high impact, but which does not occur regularly. This logic can also be found in the case of life insurance. But for many other conventional insurance products, the logic is different because the financial reserve must be re-constituted on an annual basis, and every year, the risk that is being insured (e.g., livestock theft, injuries) may re-occur.

The fact remains that insurance must in no way constitute a factor which weakens the risk-management strategies followed by the herders themselves, the most important of which is mobility. Although index-based insurance has the advantage of considerably reducing this risk (in the event of a crisis, whether or not he leaves, the insured herder will receive compensation, so he has every interest in leaving and saving his animals), the moral risk associated with conventional insurance should not be dismissed. For instance, a herder insured against livestock diseases in his herd at a compensation rate approximating the commercial value of his animals, may be incited to neglect investing in animal health.

In all these cases, the capacity to anticipate and prevent crises (both for governments and herders) must remain a priority that may then call into perspective the interest for the herder to take out insurance: "anything that can be done to predict and prevent (for example, animal health services) must absolutely be done." Given this context, it might well lead to the question as to whether there is much point in having livestock insurance: "rather than insuring animals at a high cost, a cost which is perhaps too high for the herder to bear, it would make more sense to strengthen prevention and to provide herders with tools that are properly adapted to risk management: secured access to hosting areas, livestock corridors, provision of basic services."

Access to services remains a fundamental dimension to be taken into consideration. For example, a herder whose herd is insured against disease will still take a set of necessary precautions before and during the transhumance: vaccination, parasite removal, procuring a supply of drugs, monitoring the health of his animals. Nevertheless, he may still end up in an area where he cannot find proper veterinary drugs, or an experienced veterinarian to care for his animals. In the event of animal losses, how will a private insurer behave?

4.9 Livestock insurance for production, but also for commercialisation

Significant deficiencies were observed in the insurance coverage provided to commercial operators in the value chain. Trekking livestock on-the-hoof to the consumer markets faces the same risks as those faced by transhumant herders. However, both for trekking on-the-hoof as well as for transporting livestock by trucks, all operators in the value chain criticize the difficulty of finding adequate insurance coverage. However, livestock traders make up a potential clientele that could easily be convinced to take more of an interest in livestock insurance. Livestock being trekked for commercial purposes has a high value and takes place over specific periods of time. The same applies to the transportation of animals on trucks. Normally, even though the vehicle's insurance should insure its contents and the transporter has civil liability coverage, it is very often observed that road accidents will frequently result in being a loss for the livestock traders.

4.10 Conclusion: the need for a continued dialogue

At a time when West African governments, sub-regional institutions and civil-society organisations are dealing with important issues related to the future of the livestock sector, the issue of livestock insurance for mobile herders has not yet come onto the agenda as a subject for any real debate. Apart from rare initiatives (notably the experience from Senegal), the attention being paid to this subject matter is still extremely limited. As a result, in-depth work remains to be done in order to

establish a sustained dialogue between key stakeholders in the insurance sector and herders. Among other things, the design of insurance products for mobile livestock involves multiple technical difficulties that discussions with herders may help to resolve (for example, on the question of choosing which animals to insure, rather than insuring the entire herd).

It is therefore no surprise that at the end of the workshop, a first conclusion stands out: too many questions still remain unanswered to allow for a simple and mechanical transfer (to the Sahelian situation) of insurance products designed and developed in very different contexts, such as in Mongolia and Kenya.

Above all, livestock insurance should rely on the principle that the investment to be made has to be shared between governments (if they subsidize part of the costs), the private sector and herders. Furthermore, this investment should be useful and viable over the long term for all parties involved. Many conditions must therefore be met in order to make livestock insurance sustainable; but most of these conditions have yet to be met.

In particular, it is important to respond with certainty to a very basic question that concerns many herders: "what is the point of livestock insurance and what is in it for us – i.e. how do we benefit?" For pastoralists and agropastoralist, conventional or index-based livestock insurance is not really a well-known product, and remains a sensitive issue. Multi-stakeholder dialogue is necessary in order to initiate and eventually lead to an informed debate. Research issues remain to be resolved, such as the type of index to use. Setting up insurance is also challenging because managing risks on such a scale (an entire production sector, risks to be evaluated over long distances and in different countries) requires joint intervention between governments, herders' associations and the private sector.

For a number of the workshop's participants (especially herder representatives) index-based insurance was not seen as being suitable to their situation. "We need to let time take its course, be cautious, know how to innovate if needed, but not to play with fire." Several times during the workshop, a double observation would be emphatically highlighted: "herders have never insured their livestock, and the best insurance against all risks is to be able to be mobile and feel safe wherever we go with our herd."

Indeed, a dialogue between the involved parties continues to be lacking. In the field, herders are poorly served and information does not reach them, especially not the ideas being developed by the insurance sector. Insurance is based on a sharing principle (the principle of mutualisation, risk pooling), of solidarity and redistribution. In this context, governments need to take a central position despite their own financial limitations. The choices of investment should be made according to a coherent vision and an overall strategy of how to manage pastoral risk, including the securing of mobility and the access to basic services. What interest is there in insuring herders if, in a situation where they cannot be mobile, they are struck with the full force of a drought and see their livestock perish? Similarly, why insure livestock against disease if it is not possible for the herder to access animal health professionals and good quality drugs during the transhumance?

A dialogue needs to be opened between herders and those insurance providers who are ready to innovate and be flexible. The partitioning between index-based and conventional insurance is not airtight. Compromises can be made, including taking into consideration livestock mobility (e.g., animal earmarking).

It is not certain that livestock insurance is compatible with the fight against poverty. Therefore, we need to give the insurance products sufficient time to prove their worth. The dialogue is now open. It should be expanded based on an informed debate allowing each involved stakeholder the possibility to understand the challenges posed and to take informed positions.

Although an insurance system, whatever form it takes, must imperatively be part of an overall strategy of risk management, the question of sharing the impacts of these risks remains fundamental: to what extent should risks be borne by herders? The approach developed in Mongolia was based on the principle that frequent risks leading to few losses are the herders' responsibility, up to a threshold of approx. 6% of the mortality rate. These mortalities may be the result of climate events covered by index-based insurance, but also of any other risk. Fundamentally, it was therefore considered that a mortality rate of a family's herd remaining under this threshold would in some way be part of the risk incurred as a "normal" result of the herding activity itself.

In the West African context, the application of such a threshold is cause for a number of observations. First of all, if we refer to the natural growth rates of large and small livestock and to the reconstitution time this entails, a loss of 6% of herd numbers is theoretically manageable for herders. However, since these are risks deemed to be frequent and with limited impact, certain conditions must be met for such a level of loss to be bearable by herders over the long term. The starting herd size must have a sufficient size in numbers, and in addition, the structure of the herd must provide a strategic balance between large and small livestock. In a large herd, with a herd structure comprising diverse species, a loss will be easy to recover from through reproduction. However, if the herd is smaller, and with fewer large livestock, losses will take much longer to recover from. In other words, a transhumant herder with a small herd, or a herd comprised only of a single animal species, will become more and more vulnerable year after year, ending up with the decapitalisation of his herd.

Secondly, the AFL-BRACED/EU study showed loss rates that are high: 8.5% for cattle, 11.9% for sheep and 23.6% for goats. Furthermore, strong disparities have also been observed, depending on the household: a quarter of them reported losses from 7% all the way up to 82%.

Such disparities lead inexorably to the extreme heterogeneity of situations at household level in West Africa and therefore, to the basis risk that will remain a major constraint in an index-based insurance. Herders leaving on transhumance, do not set off on an equal footing.

Finally, investment in anticipating and mitigating climate or other crises (e.g., livestock corridors, health monitoring against epizootic disease) may offer an optimal cost-to-benefit ratio, mirroring the age-old strategies used by herders themselves: preparing for the worst, remaining mobile and leaving at the first signs of a climate event.

ANNEX 1. List of participants (alphabetical order)

A. Organisation	Country	Names	Title
AMDE	Mauritanie	Habibata Koita	Présidente
APESS	Sénégal	Dr Mamadou Ba	Coordinateur Régional Pôle Ouest APESS-CRIPA Thiès
APESS	Cameroun	Mr Idrissa Youssoufa	Coordinateur APESS-CRIPA Garoua
BIT (Impact Insurance)	Sénégal	Moussa Dieng	Coordonateur National Projet Microassurances
CILSS	Burkina	Maty Ba Diao	Coordinatrice régionale du PRAPS au CILSS
CISV-Italie	Sénégal	Dr Cissé	Assistant technique-BRACED
CNAAS	Sénégal	Pape Amadou Ndiouga NDIAYE	Directeur Général
CNAAS	Sénégal	Insa Sow	Assistant - Responsable production
Consultant	Sénégal	Dr Oussouby Touré	Expert en pastoralisme
Délégation de l'Union Européenne (Echo)	Sénégal	Michael Flachaire	Expert Technique
GNAP	Mauritanie	El Hacen Ould Taleb	Président
GNAP	Mauritanie	Kane Aliou Hamadi	Coordinateur
GNAP	Mauritanie	Ly Ibrahima Oumar	Consultant, coordinateur DDV
ICRISAT	Sénégal	Issa Ouedraogo	Chercheur et Coordonateur USAID-CINSERE
ISRA-BAME	Sénégal	Dr Astou Camara	Sociologue-pastoraliste
ISRA-BAME	Sénégal	Moussa Sall	Agro-économiste, Chargé de Recherche
JICA (Coopération japonaise)	Sénégal	Meri Fukai	Chargée de formulation de projets
MANOBI	Sénégal	Madieye Ndour	Business Unit Manager
MANOBI	Sénégal	Luc Kafando	Expert en assurance agricole
Ministère de l'Élevage et des Productions Animales	Sénégal	Dr Mamadou Ousseynou Sakho	Secrétaire Général du Ministère
Ministère de l'Élevage	Mauritanie	Dr Sidi Mahmoud Ismail	Chargé de mission au Ministère

OP Sénégal	Sénégal	Aboubacry Diallo	Président FODEPA
OP Sénégal	Sénégal	Sega Sy	Secrétaire général Kawral
OP Sénégal	Sénégal	Kalidou Bah	Secrétaire Général EGAB
OP Sénégal	Sénégal	Abou Sow	Animateur ADID
OP Sénégal	Sénégal	Moctar Diallo	Acteur de développement
Planet Guarantee	Sénégal	Amath Diama COBAR	Expert en formation, marketing et communication
Programme Alimentaire Mondial (PAM)	Sénégal	Yacine Fall	Chargé de Programme Assurance Agricole Indicielle
Programme Alimentaire Mondial (PAM)	Sénégal	Wilfred Kwambi	Chargé de Programme
RBM Sénégal	Sénégal	Moussa Sow	Coordinateur BRACED-Sénégal
RBM Sénégal	Sénégal	Naiba Sow	Responsable Administrative et Financière, ASE_rbm
RECOPA	Burkina	Salou Diallo	Président
RECOPA	Burkina	Boubacar Maiga	RECOPA-Est
FACILITATING TEAM	**COUNTRY**	**NAMES**	**TITLE**
Nordic Consulting Group	Danemark	Dr Brigitte Thébaud	Experte en agropastoralime et facilitatrice principale
ARED	Sénégal	Samba Diallo	Zootechnicien, formateur pour l'ARED et facilitateur
ARED	Sénégal	Mamadou Abib Ka	Ingénieur zootechnicien
Acting for Life	France	Arnaud François	Coordinateur Programme agropastoralisme Afrique
Acting for Life	France	Annabelle Powell	Chargée de Programme AFL-BRACED
Acting for Life	France	Sara Teillard	Spécialiste microassurance
Acting for Life	France	Soumaila Fomba	Assistant à la Chargée de Programme AFL-BRACED

ANNEX 2. Livestock insurance for mobile herders in West Africa: Program of the workshop

Les Résidences Mamoune, Dakar, 2-3 November 2016

The workshop took place over two consecutive days according to the following schedule:

Wednesday, November 2

8:30-9:00 am: Participants welcomed

9:00-9:45 am: Introductory speech and opening of the workshop

10:00-10:30 am: Break

10:30 am-1:00 pm: Validation of the program and working times. First presentation and debate on: The role of microinsurance, the history and development of index-based insurance for livestock (from the experiment in Mongolia and northern Kenya)

1:00-2:30 pm: Lunch break

2:30-4:00pm: Second presentation and preliminary debate on: Basics of pastoral and agropastoral production in the Sahel and in West Africa: what are the implications for developing livestock insurance?

4:30-5:00 pm: Break

5:00-6:00 pm: Finalization of the debate on the second presentation

Thursday, November 3

8:30-10:00 am: Third presentation and preliminary debate on: Stakes raised and challenges to be met with the introduction of index-based livestock insurance in West Africa

10:00-10:30 am: Break

11:00 am-1:30 pm: Finalization of the debate on the third presentation, fourth presentation and debate on: Another look at the nature of risks incurred for mobile herders

1:30-3:00 pm: Break

3:00-5:00 pm: Final debate, workgroups (choice of investments, role of POs, impact on the fight against poverty) and closure to the workshop

5:00 pm: Final break

ANNEX 3. INTRODUCTION THE DEBATE I: Index-Based Insurance for livestock: historical background and how it works

PRREF-Mauritanie

UKaid Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)

BRACED

ACTING FOR LIFE AIRFRANCE

Workshop on Livestock insurance for mobile herders in West Africa

Dakar, 2-3 November 2016

1. Index-based livestock insurance: its history and how it works

Transhumant families on the move, western Mali, photo Soumaila Fomba, AFL, 2015

Introduction to debate 1: slide 1

PRREF-Mauritanie

UKaid Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)

BRACED

ACTING FOR LIFE AIRFRANCE

Les fondements de la micro-assurance

Producers bear the risk-management burden (particularly climatic risks)

(and support from producers social networks has its limits)

MICROINSURANCE

Mechanisms to product individuals with low incomes against risk (accident, sickness, death in the family, natural disaster) in exchange for the payment of insurance premiums adapted to their need and the level of risk.

(It is mainly targeted at low-income producers in developing countries, particularly those engaged in productive activities in rural areas or in the informal sector and who are often underserved by commercial insurers and social insurance systems)

available through different channels :

- Cooperatives
- Mutual support groups (tontines, etc.)
- Mutual health insurance
- Microfinance institutions (MFI)
- Regulated commercial insurers
- NGOs

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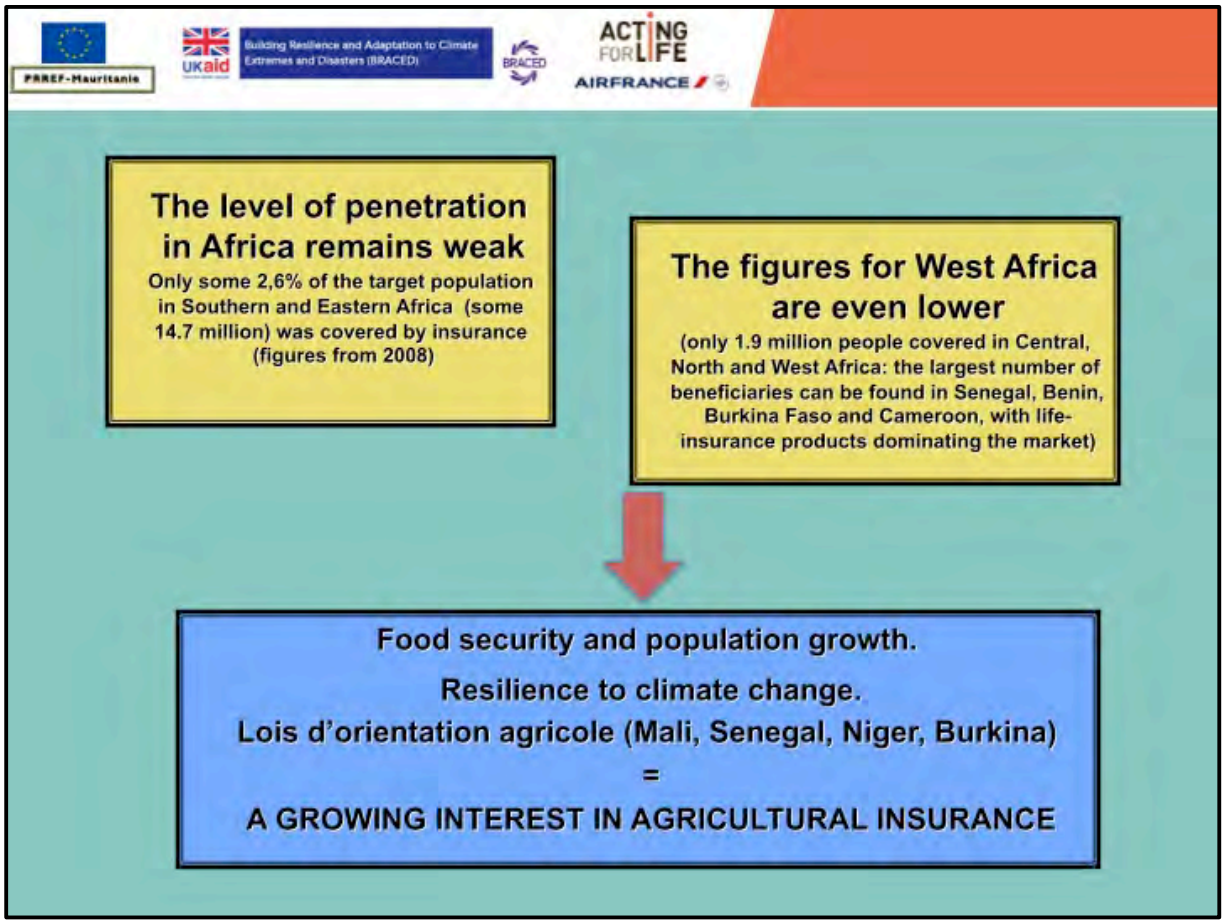

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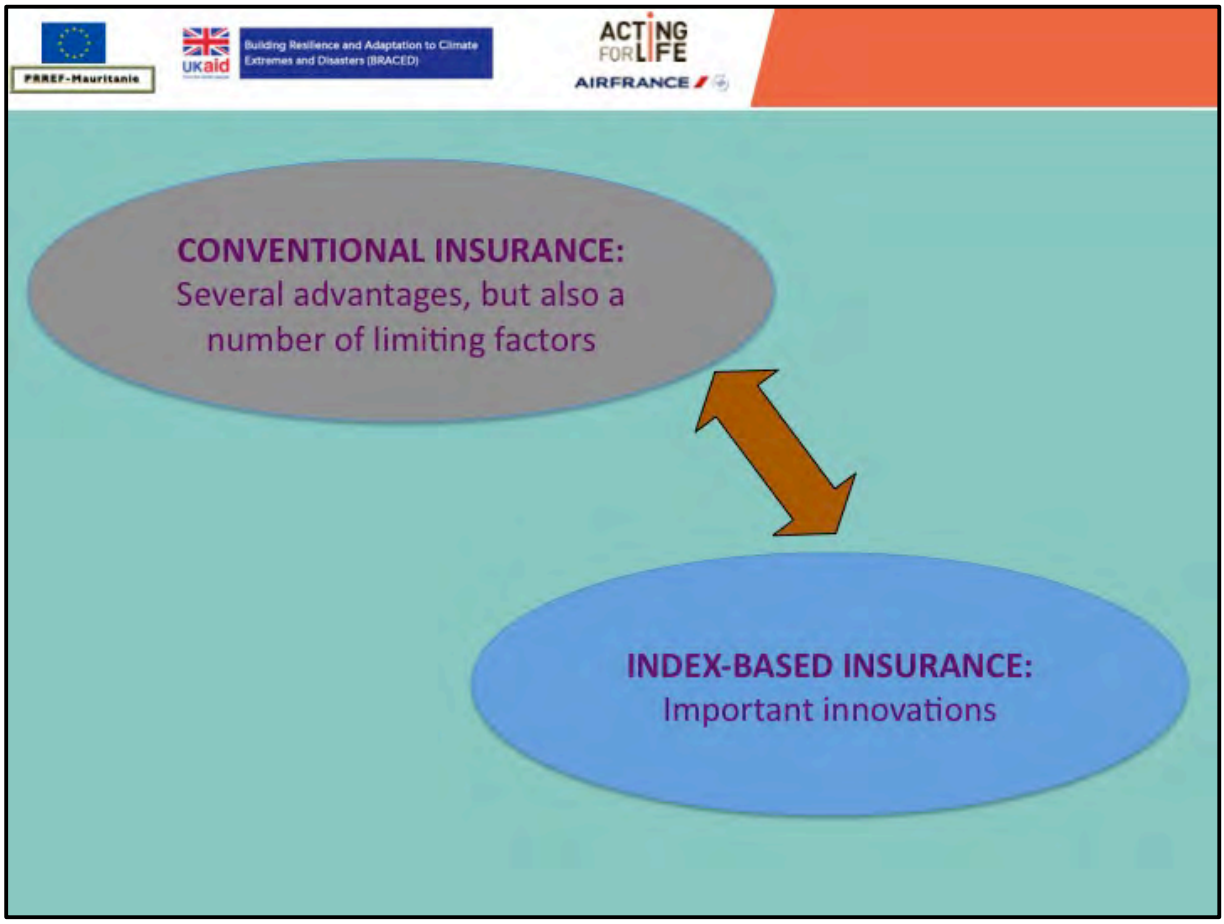

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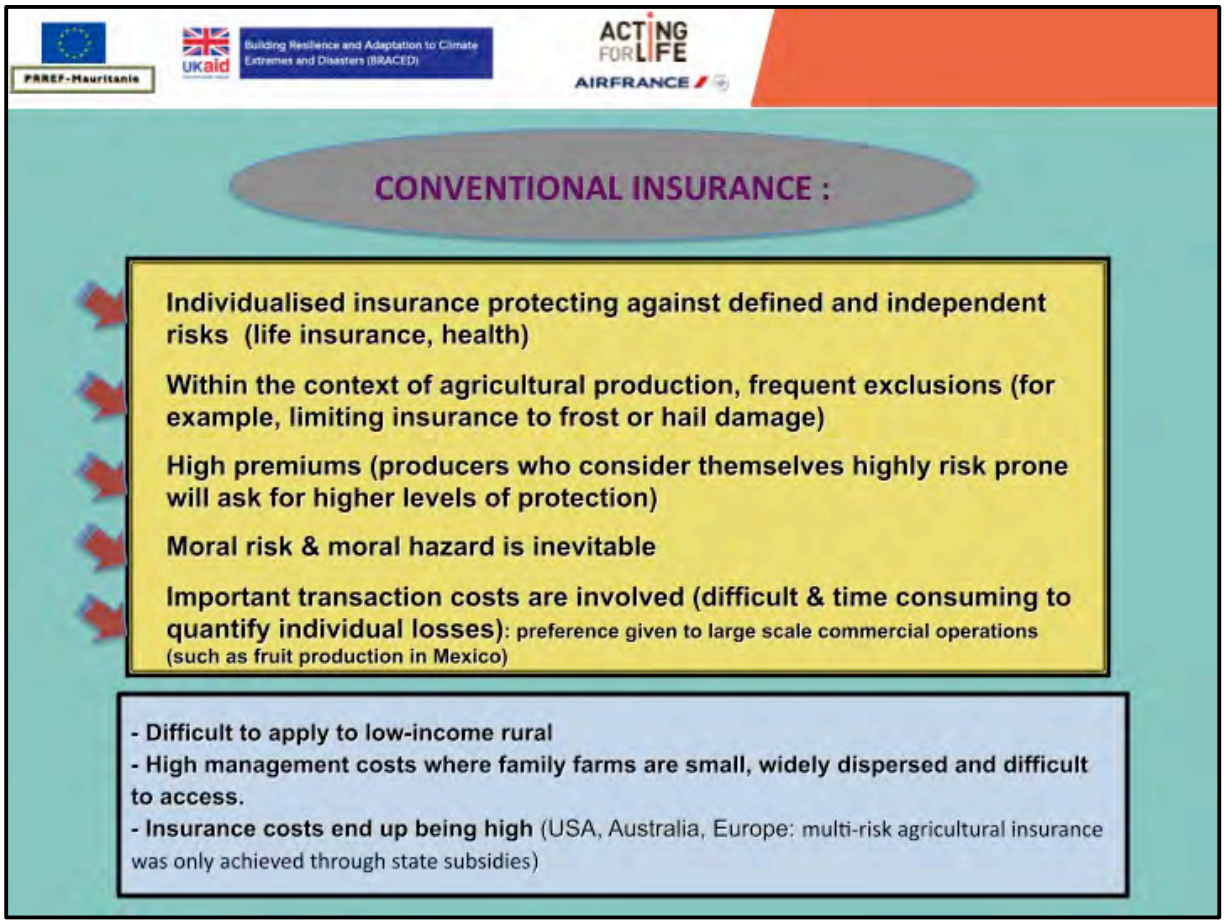

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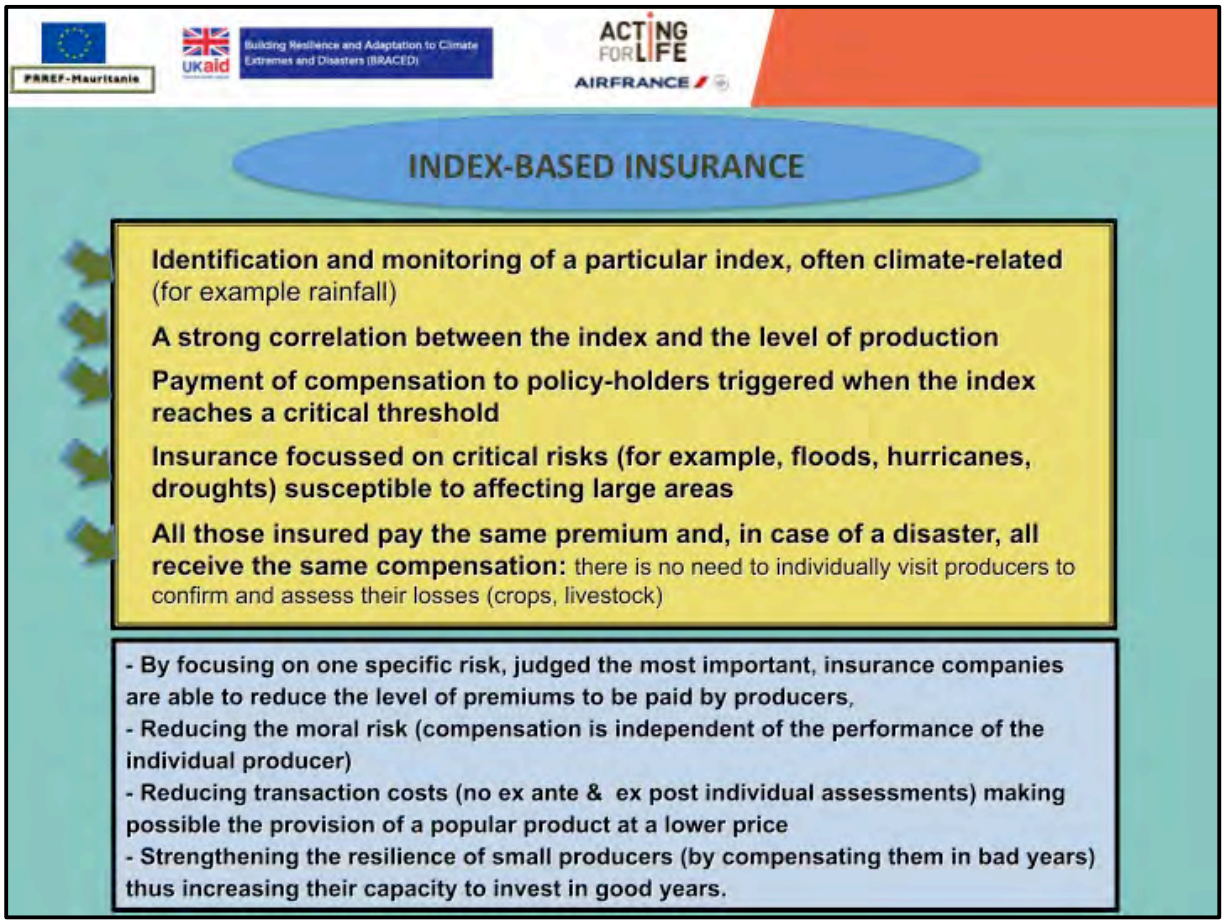

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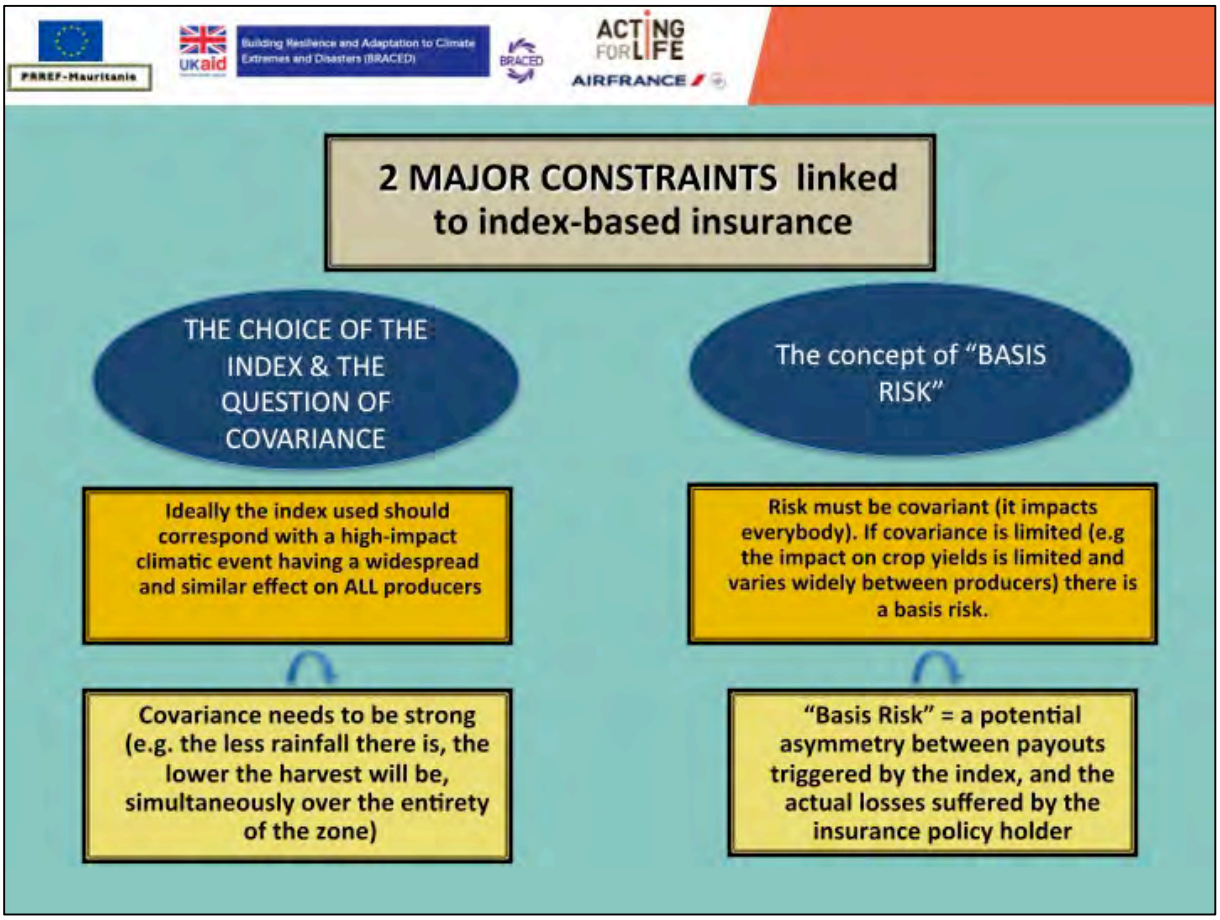

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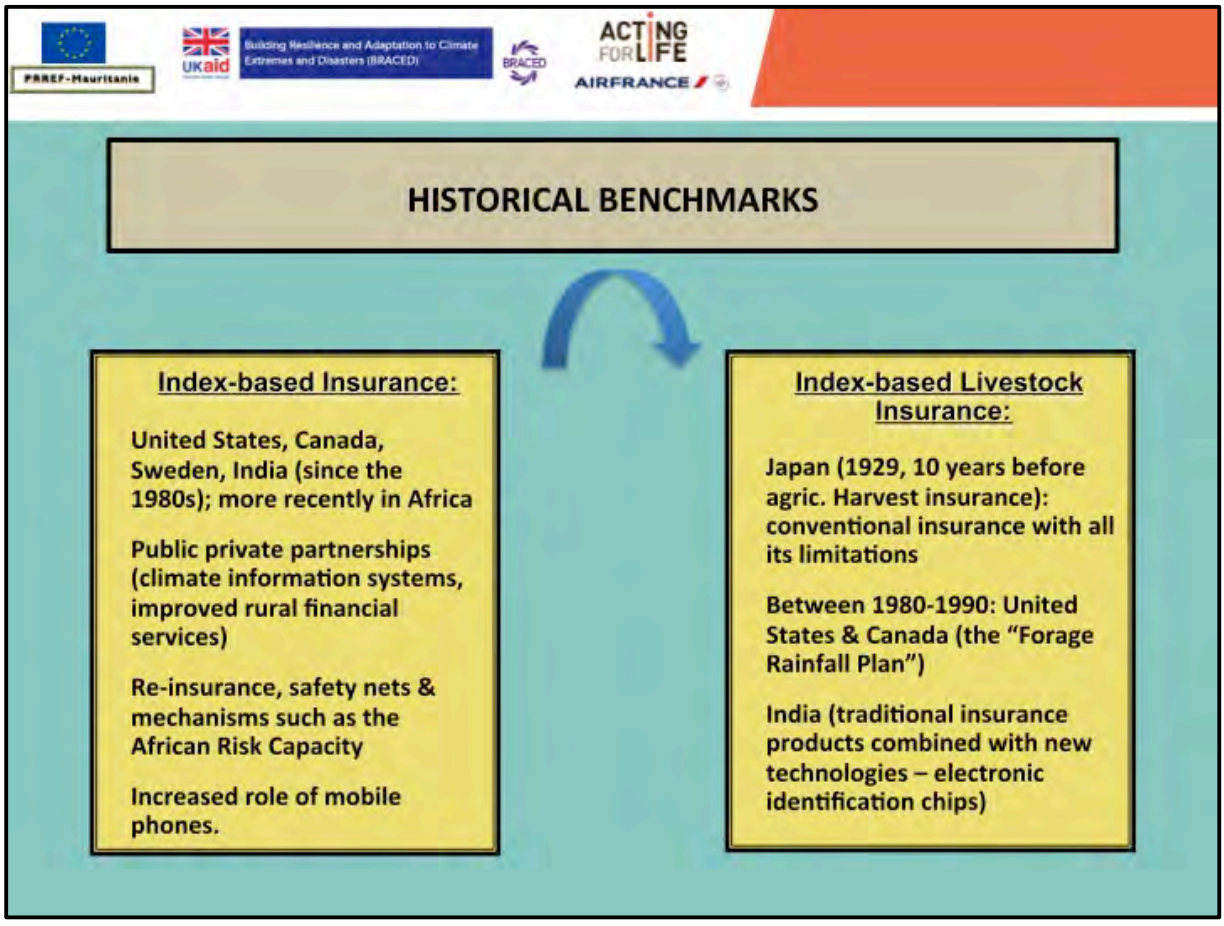

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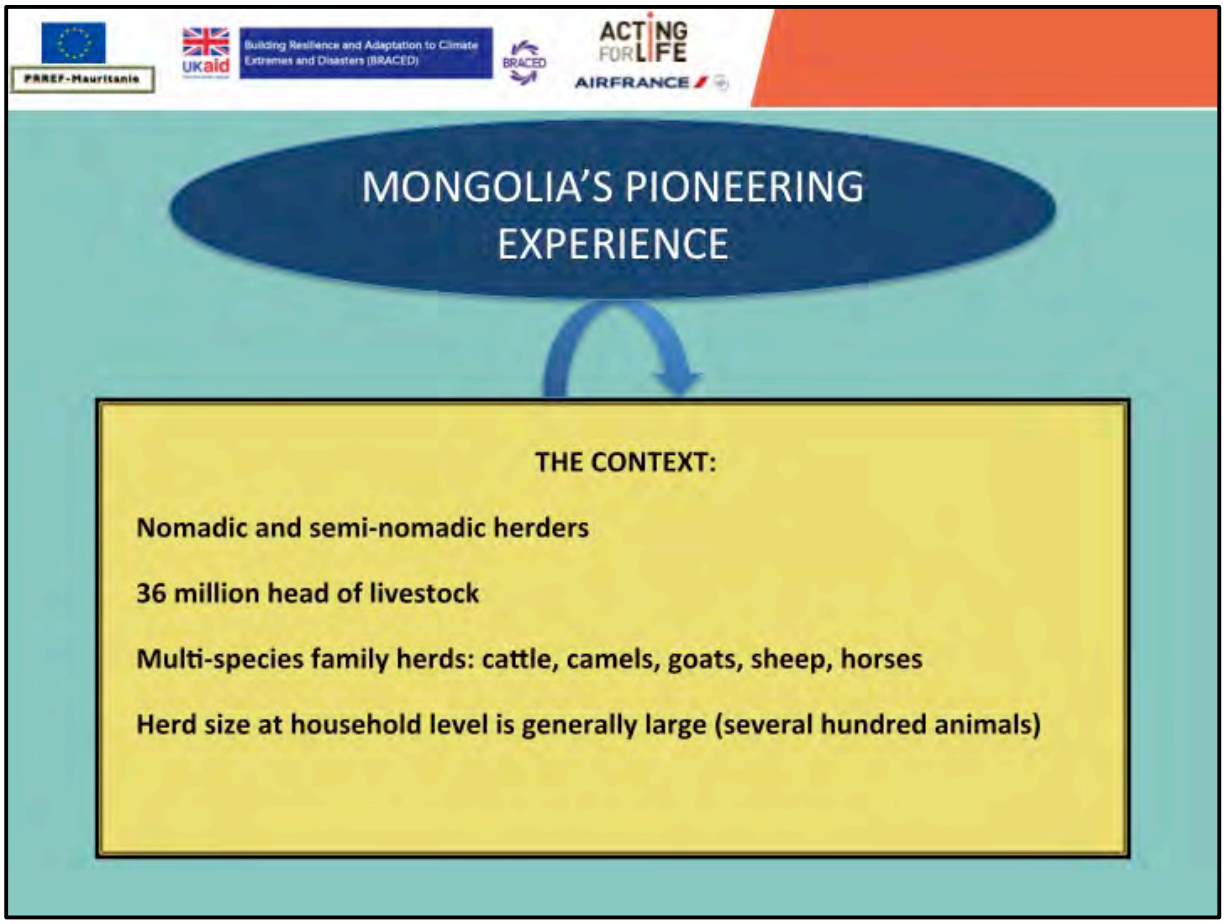

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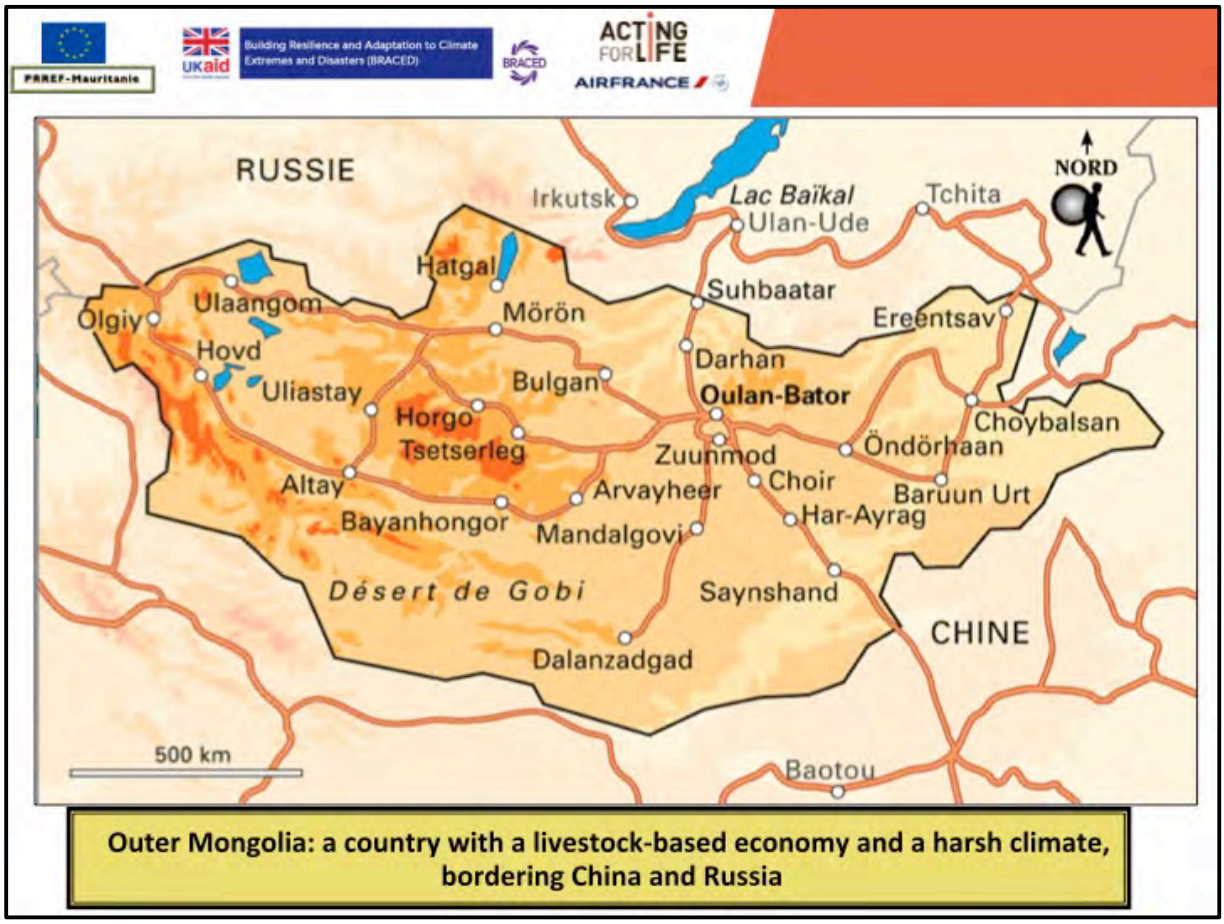

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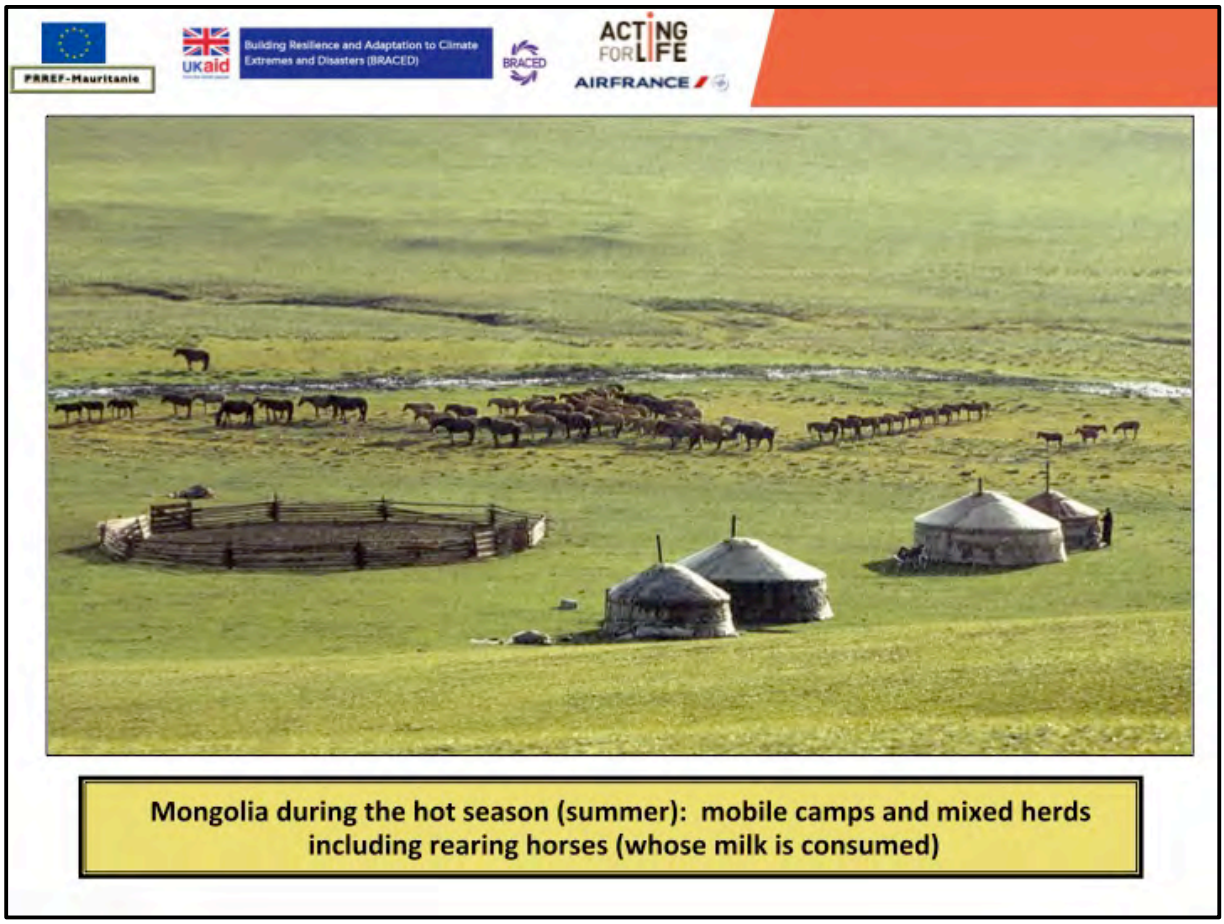

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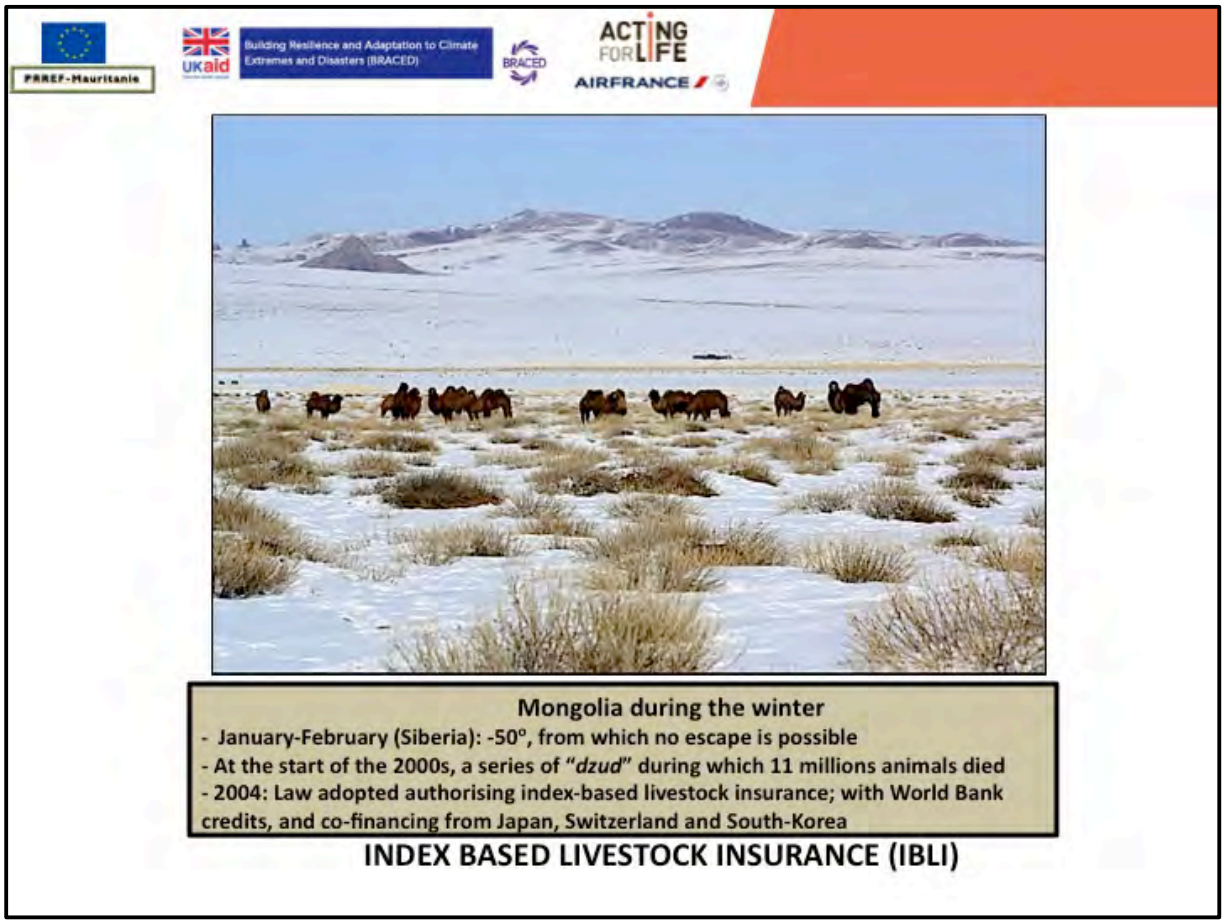

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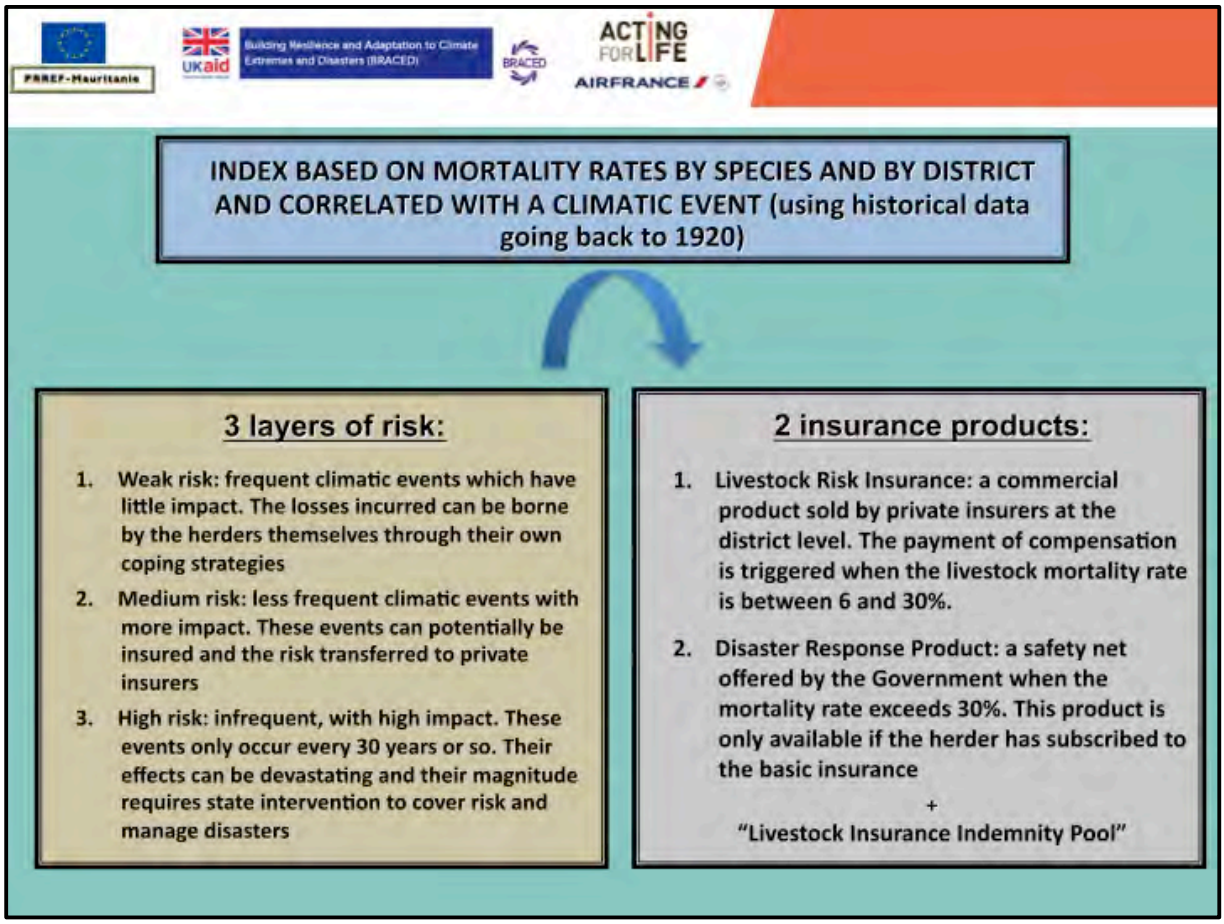

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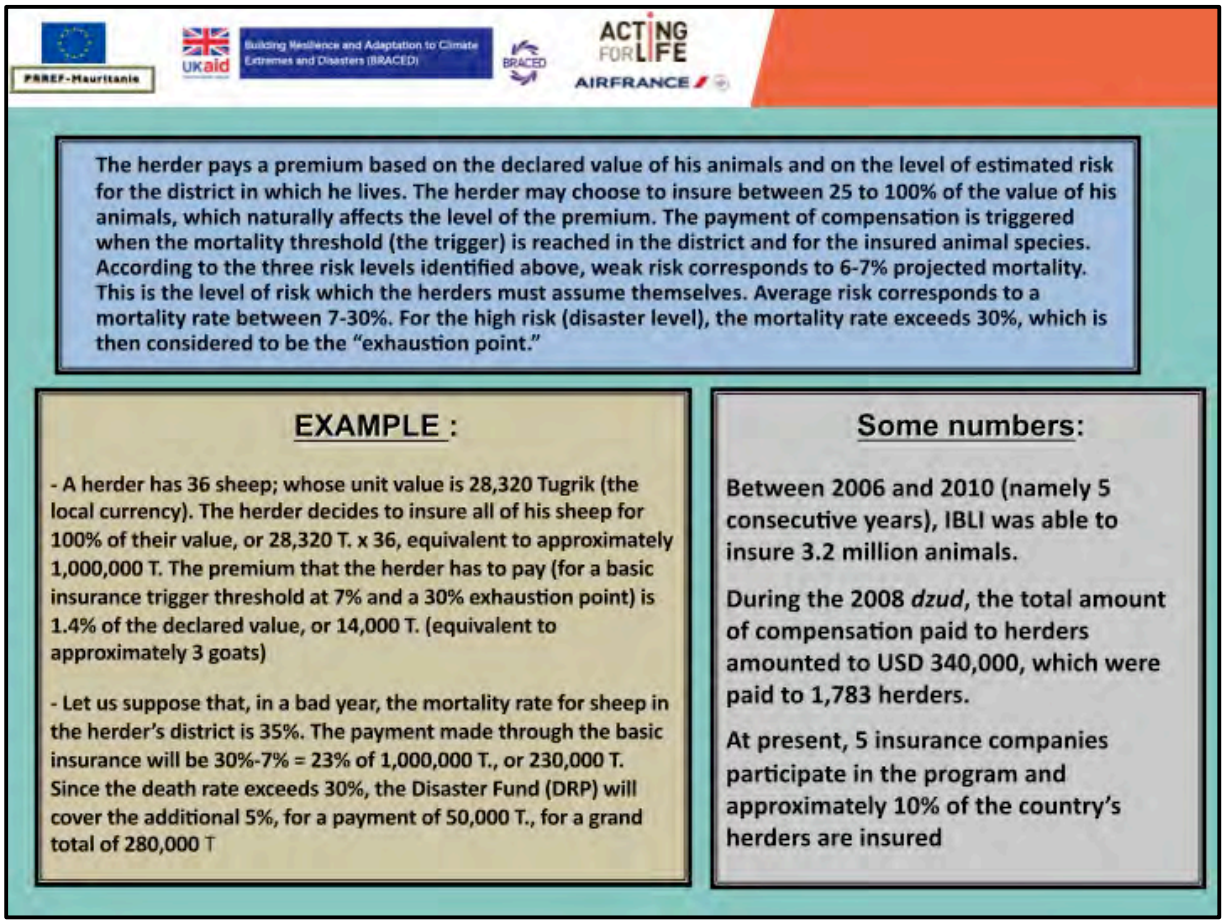

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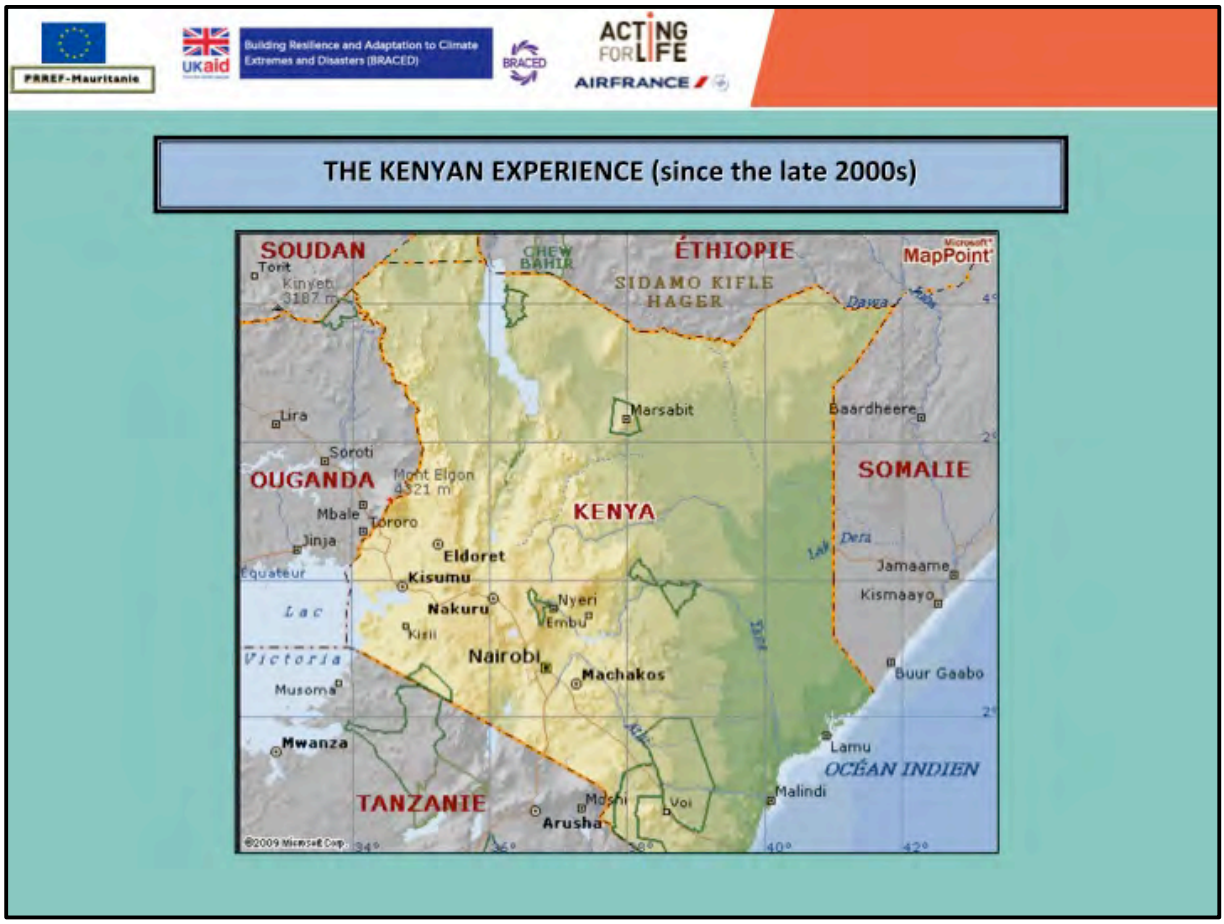

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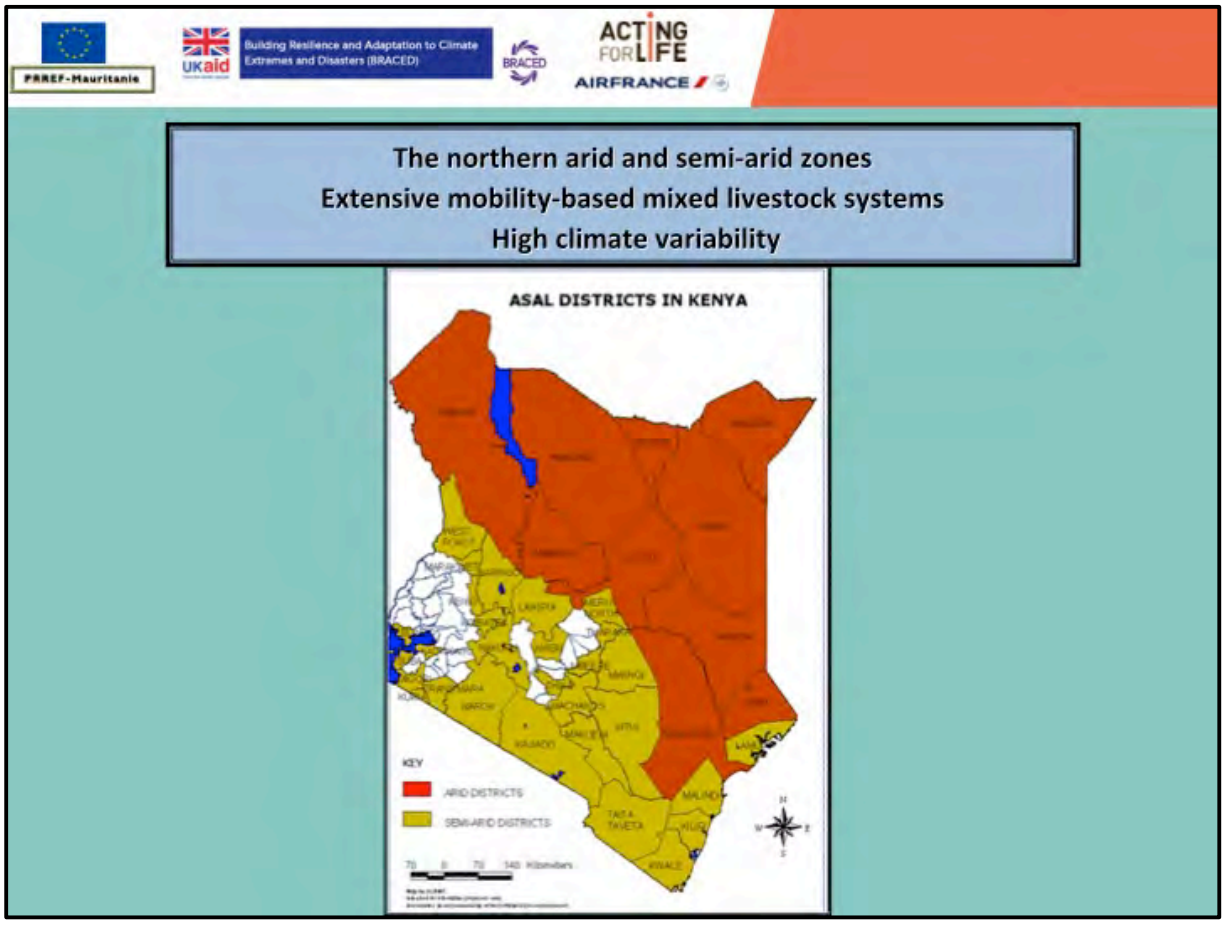

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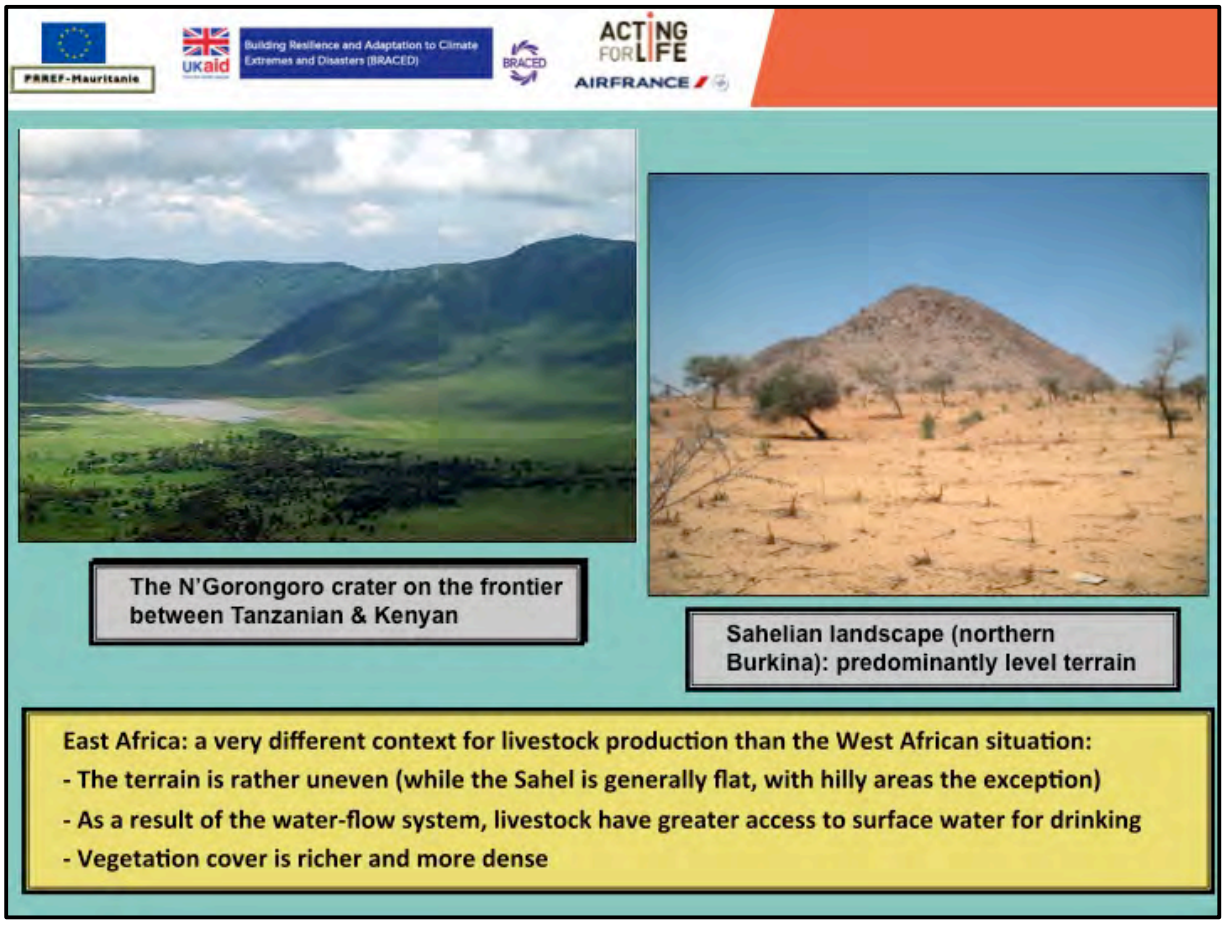

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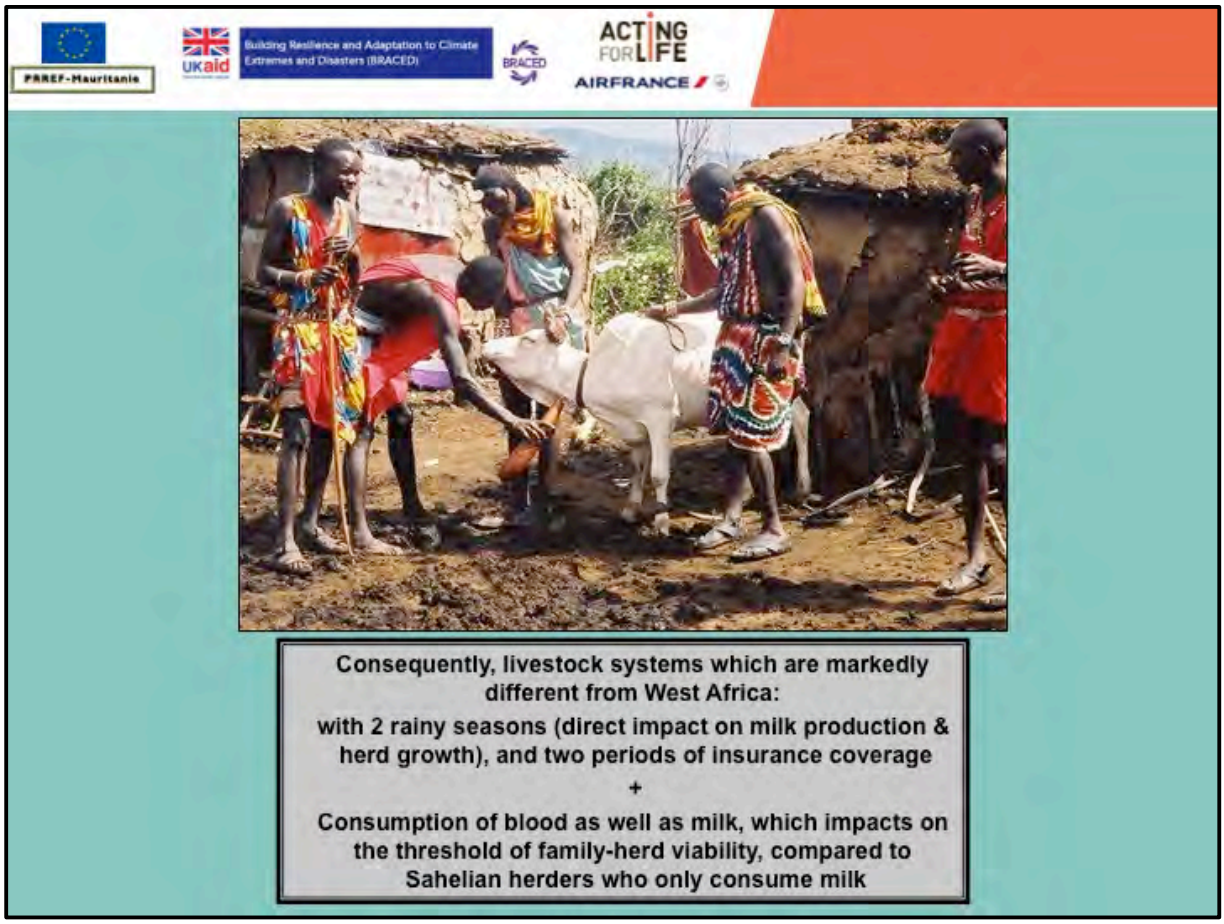

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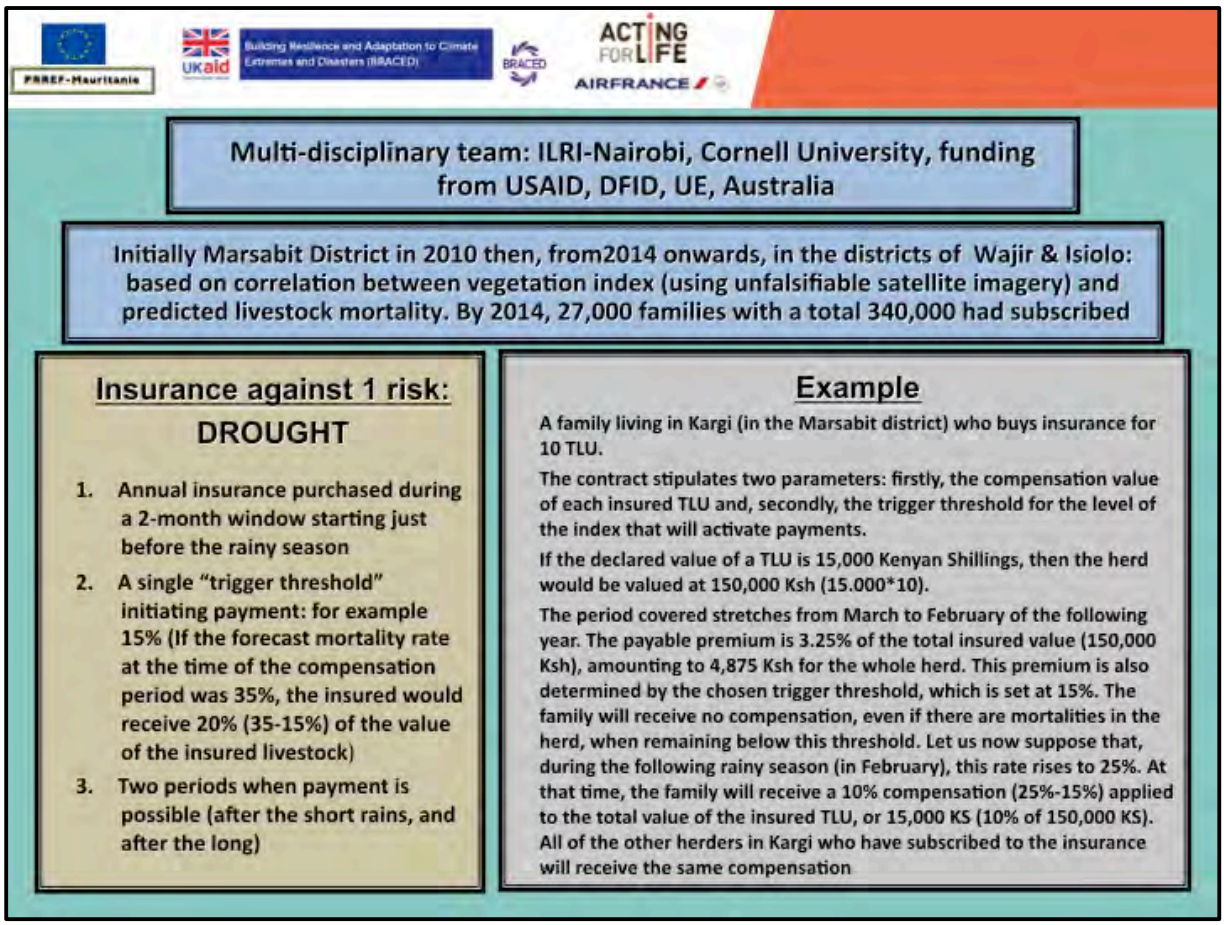
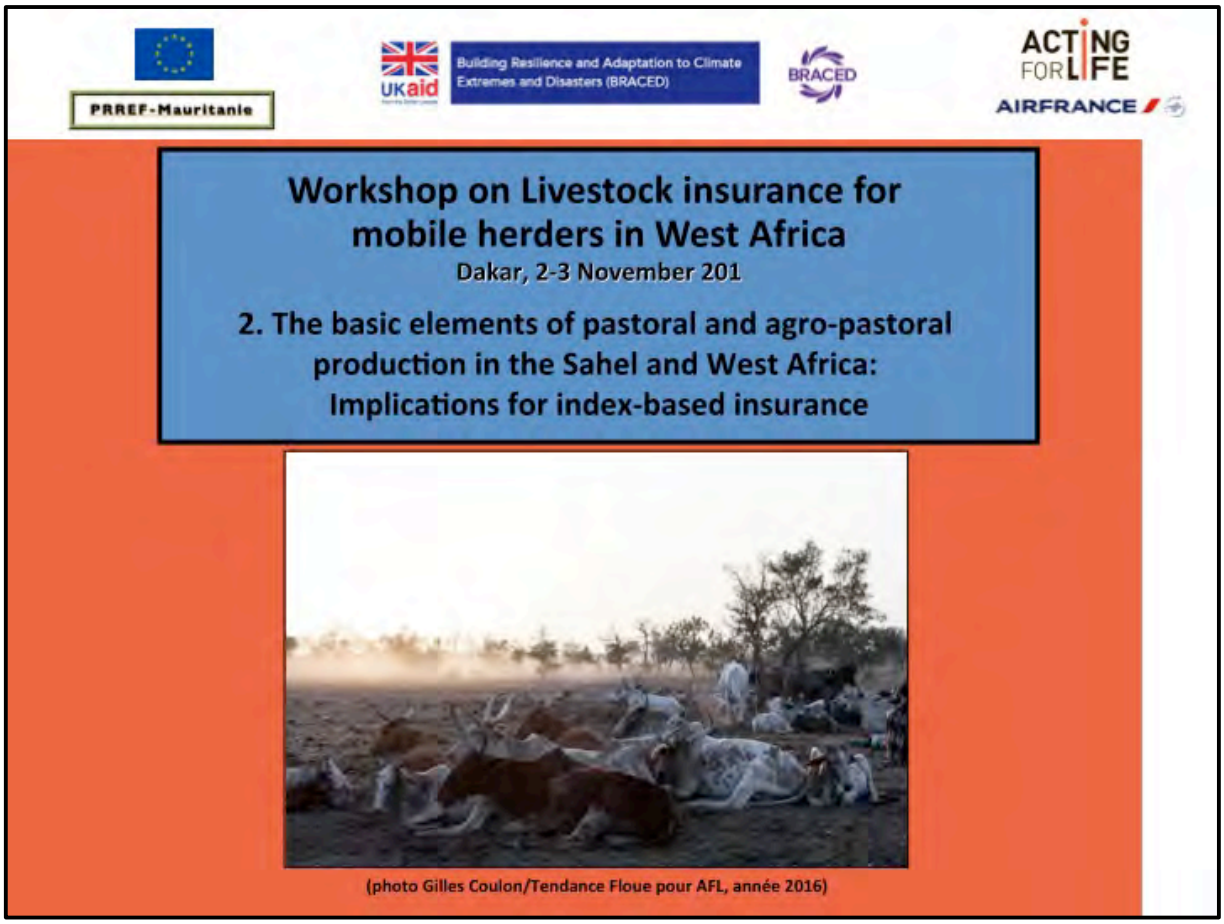


Introduction to debate 1: slide 20

ANNEX 4. INTRODUCTION TO DEBATE 2: The basic elements of pastoral and agropastoral production in West Africa, implications for the development of livestock insurance



Introduction to debate 2: slide 1

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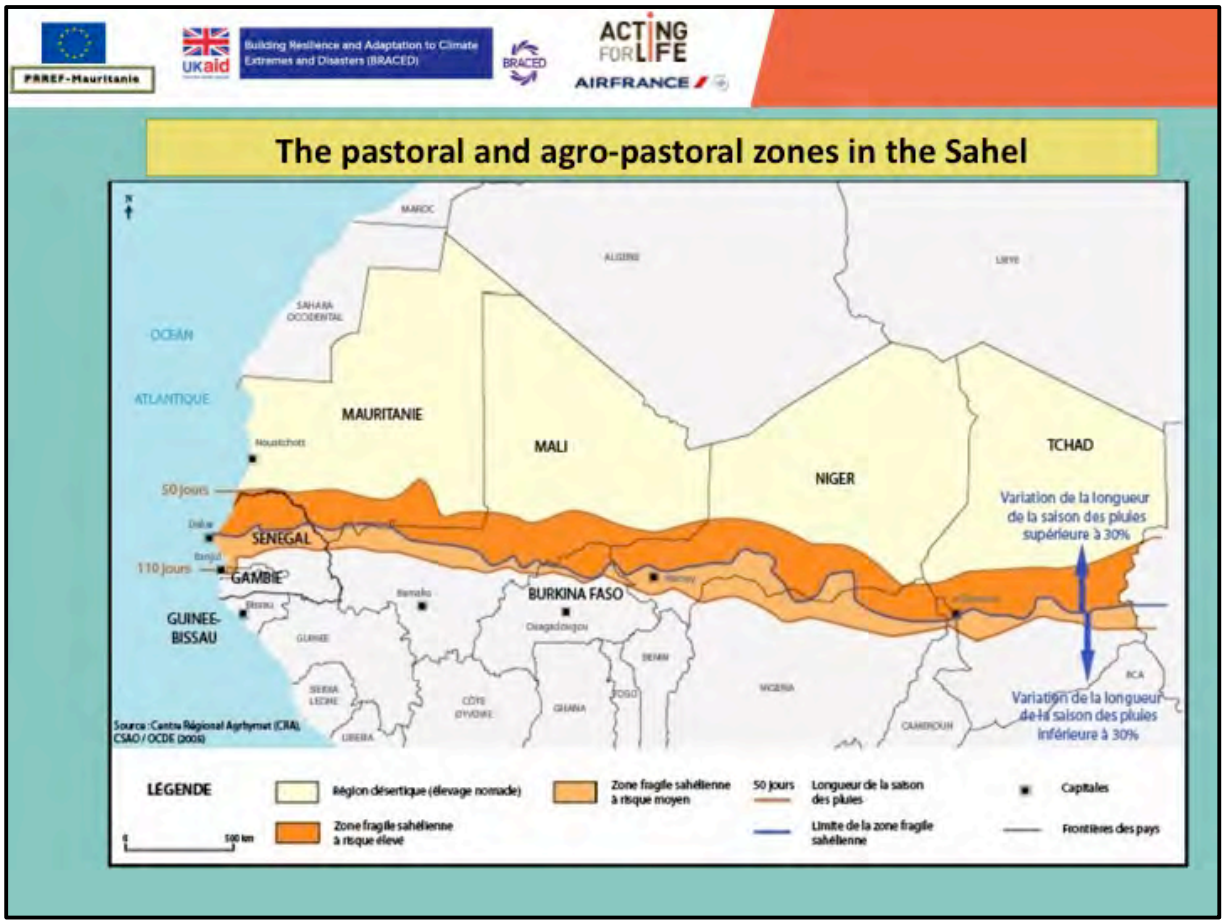

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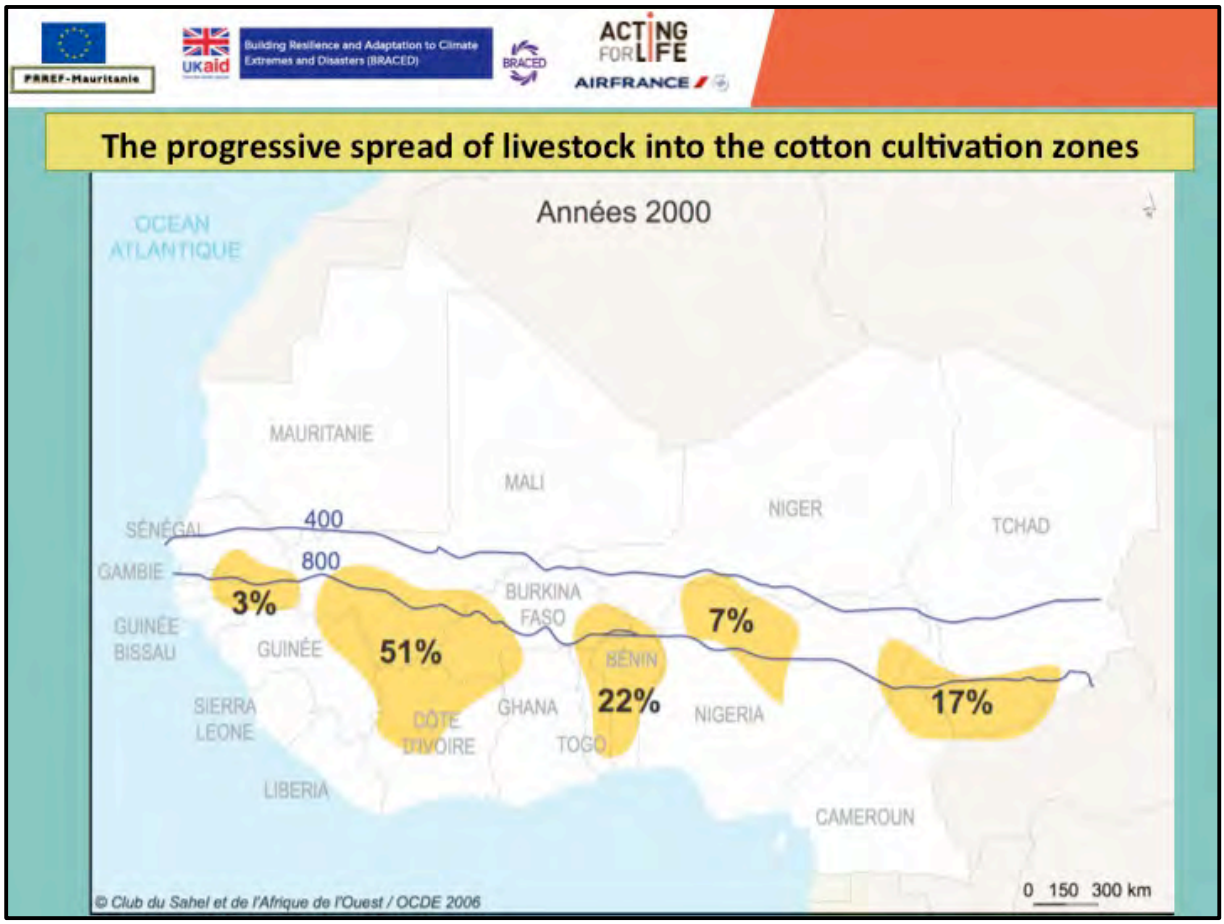

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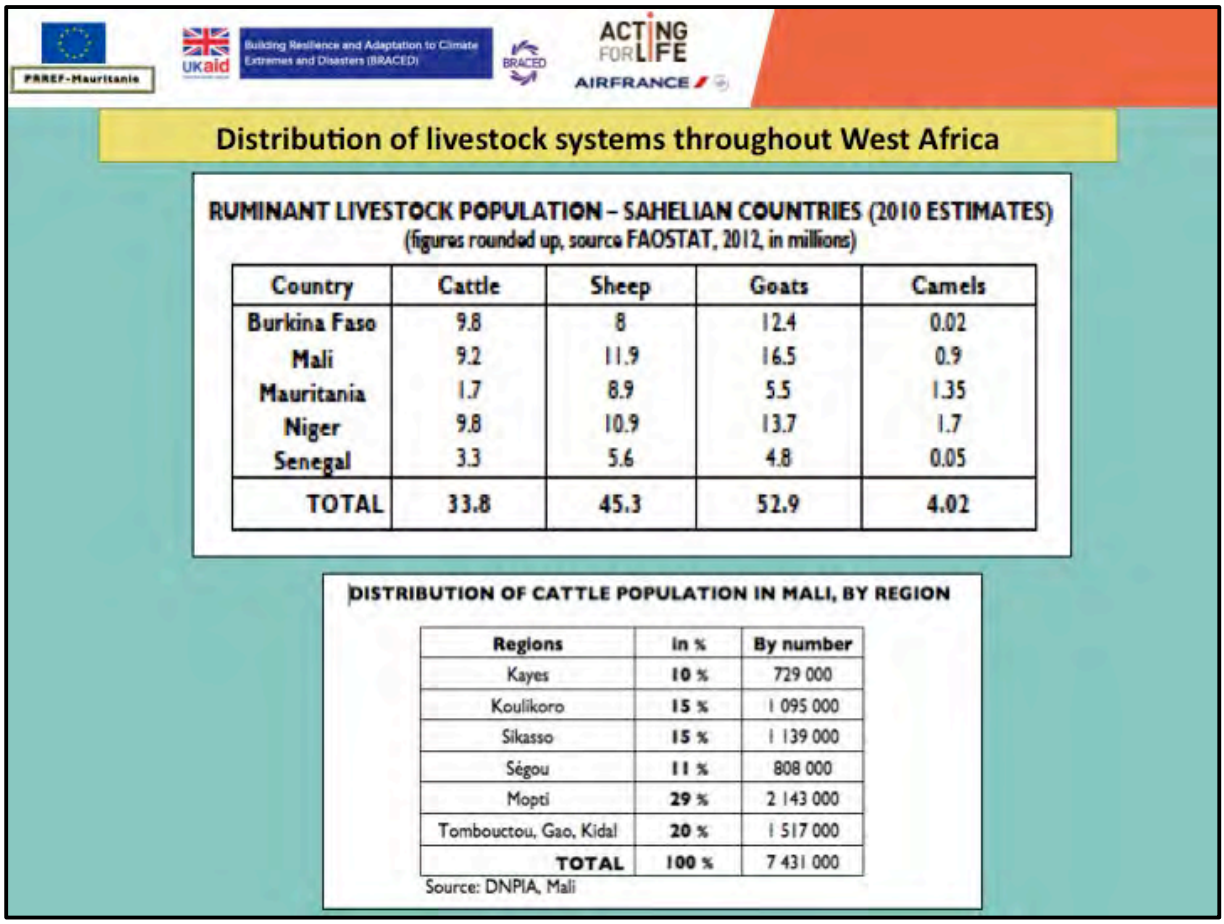


Distribution of livestock systems throughout West Africa

RUMINANT LIVESTOCK POPULATION – SAHELIAN COUNTRIES (2010 ESTIMATES)
(figures rounded up, source FAOSTAT, 2012, in millions)

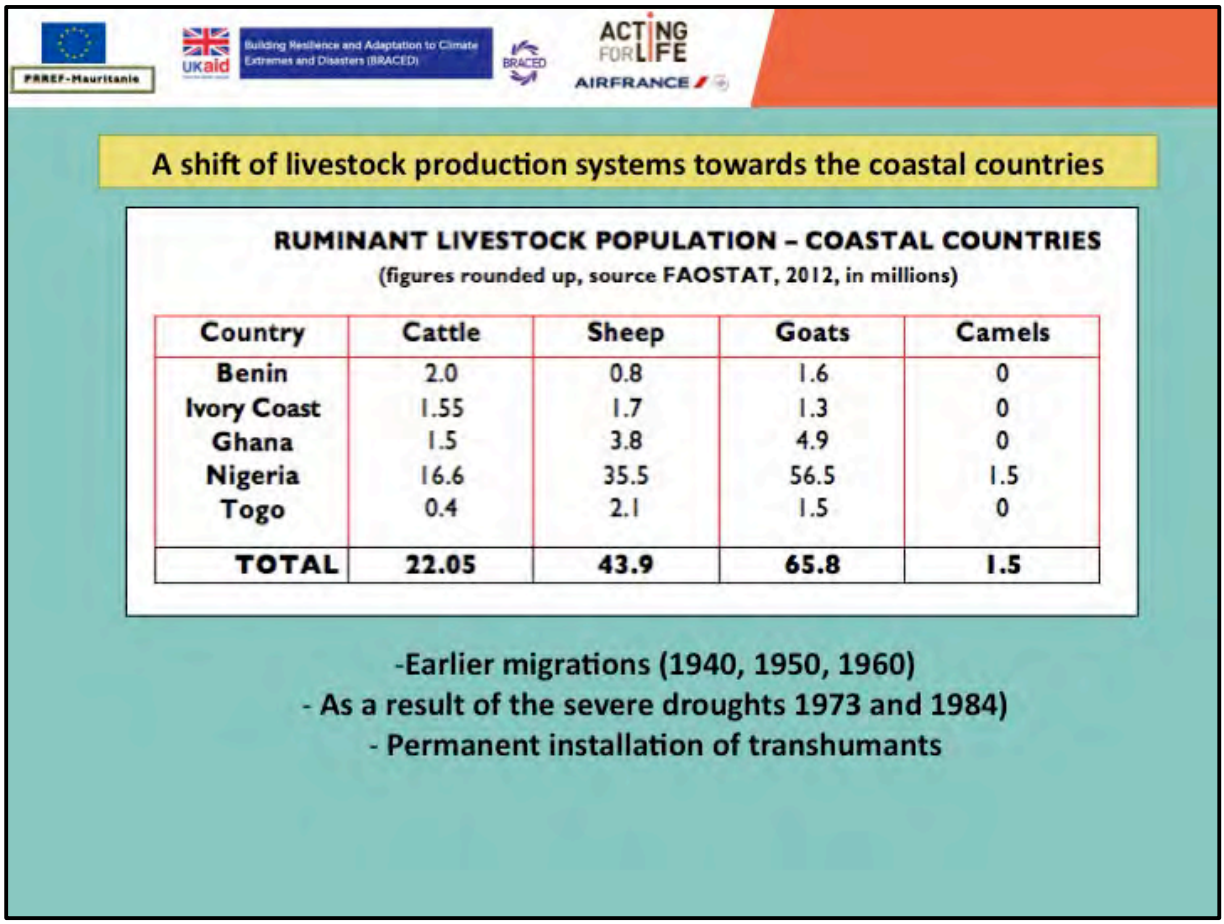
Country	Cattle	Sheep	Goats	Camels
Burkina Faso	9.8	8	12.4	0.02
Mali	9.2	11.9	16.5	0.9
Mauritania	1.7	8.9	5.5	1.35
Niger	9.8	10.9	13.7	1.7
Senegal	3.3	5.6	4.8	0.05
TOTAL	33.8	45.3	52.9	4.02

DISTRIBUTION OF CATTLE POPULATION IN MALI, BY REGION

Regions	in %	By number
Kayes	10 %	729 000
Koulikoro	15 %	1 095 000
Sikasso	15 %	1 139 000
Ségou	11 %	808 000
Mopti	29 %	2 143 000
Tombouctou, Gao, Kidal	20 %	1 517 000
TOTAL	100 %	7 431 000

Source: DNPIA, Mali

Introduction to debate 2: slide 5



A shift of livestock production systems towards the coastal countries

RUMINANT LIVESTOCK POPULATION – COASTAL COUNTRIES
(figures rounded up, source FAOSTAT, 2012, in millions)

Country	Cattle	Sheep	Goats	Camels
Benin	2.0	0.8	1.6	0
Ivory Coast	1.55	1.7	1.3	0
Ghana	1.5	3.8	4.9	0
Nigeria	16.6	35.5	56.5	1.5
Togo	0.4	2.1	1.5	0
TOTAL	22.05	43.9	65.8	1.5

-Earlier migrations (1940, 1950, 1960)
- As a result of the severe droughts 1973 and 1984)
- Permanent installation of transhumants

Introduction to debate 2: slide 6

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Agro-pastoral systems are dominant, combining livestock and agricultural production, along with other income-generating actives

Most households combine herding with agriculture (millet, sorghum, cowpea, maize, ground nuts, cotton, market gardening) and other activities (livestock marketing, trading, transport, etc.) including remittances from migrants

Introduction to debate 2: slide 7

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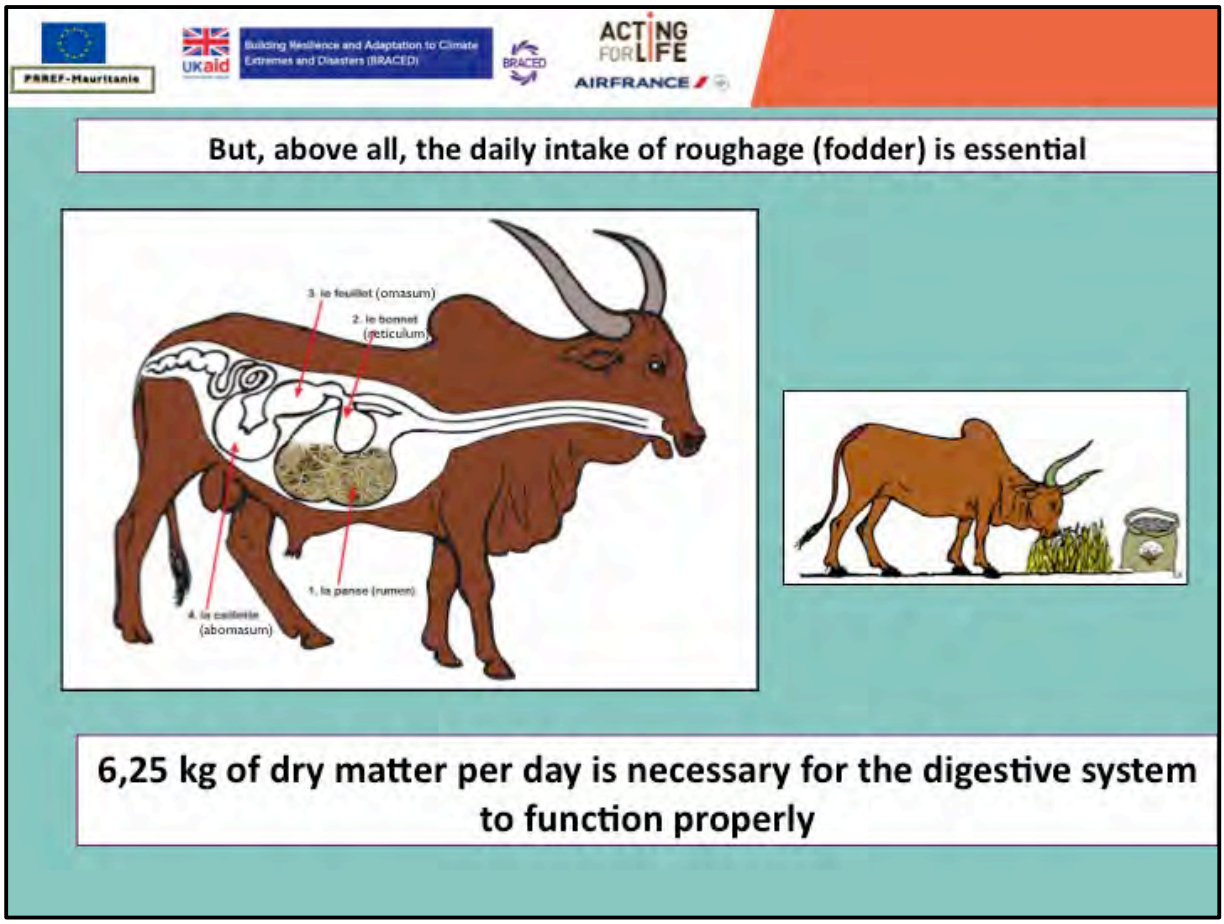
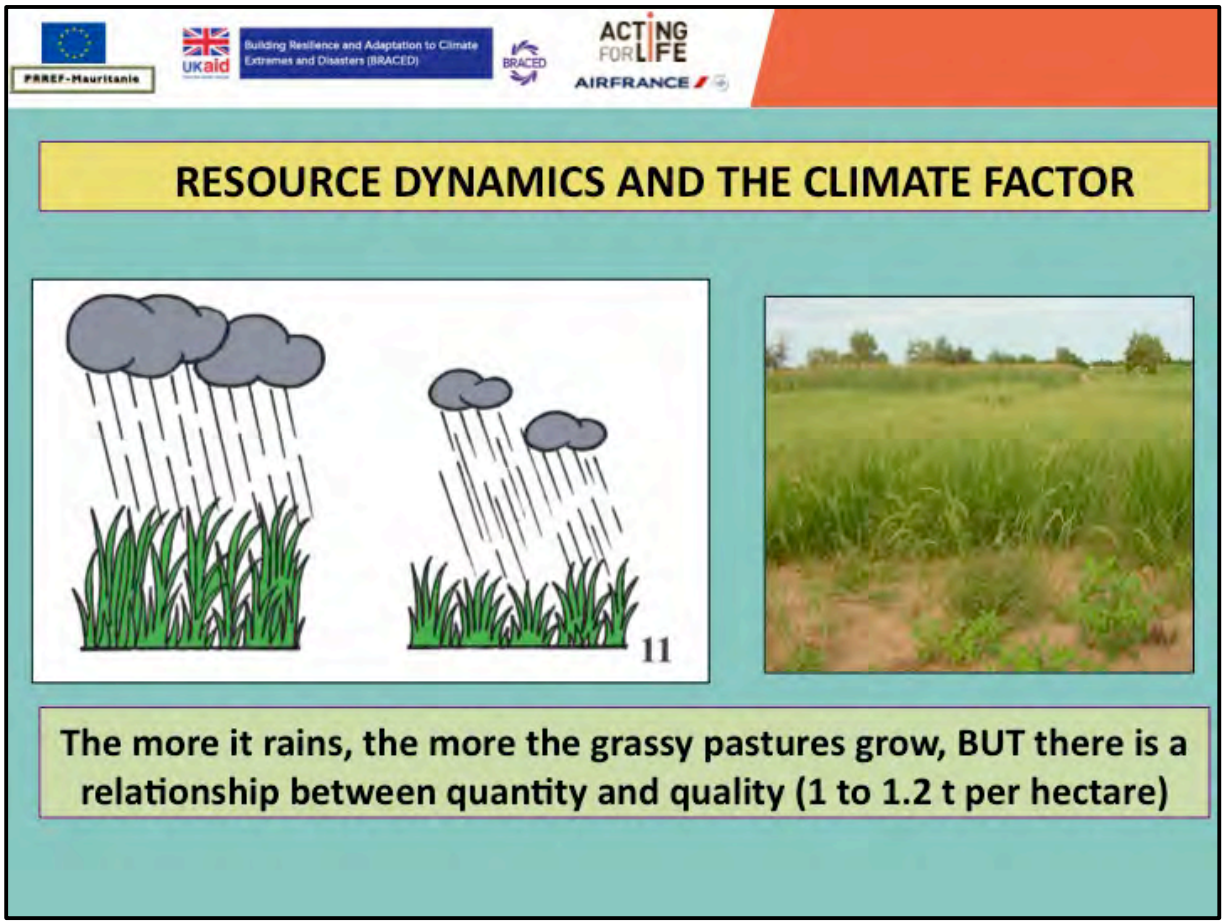
Livestock feeding relies on a range of resources, with amounts and quantities changing depending on the zone

Introduction to debate 2: slide 8



Introduction to debate 2: slide 9



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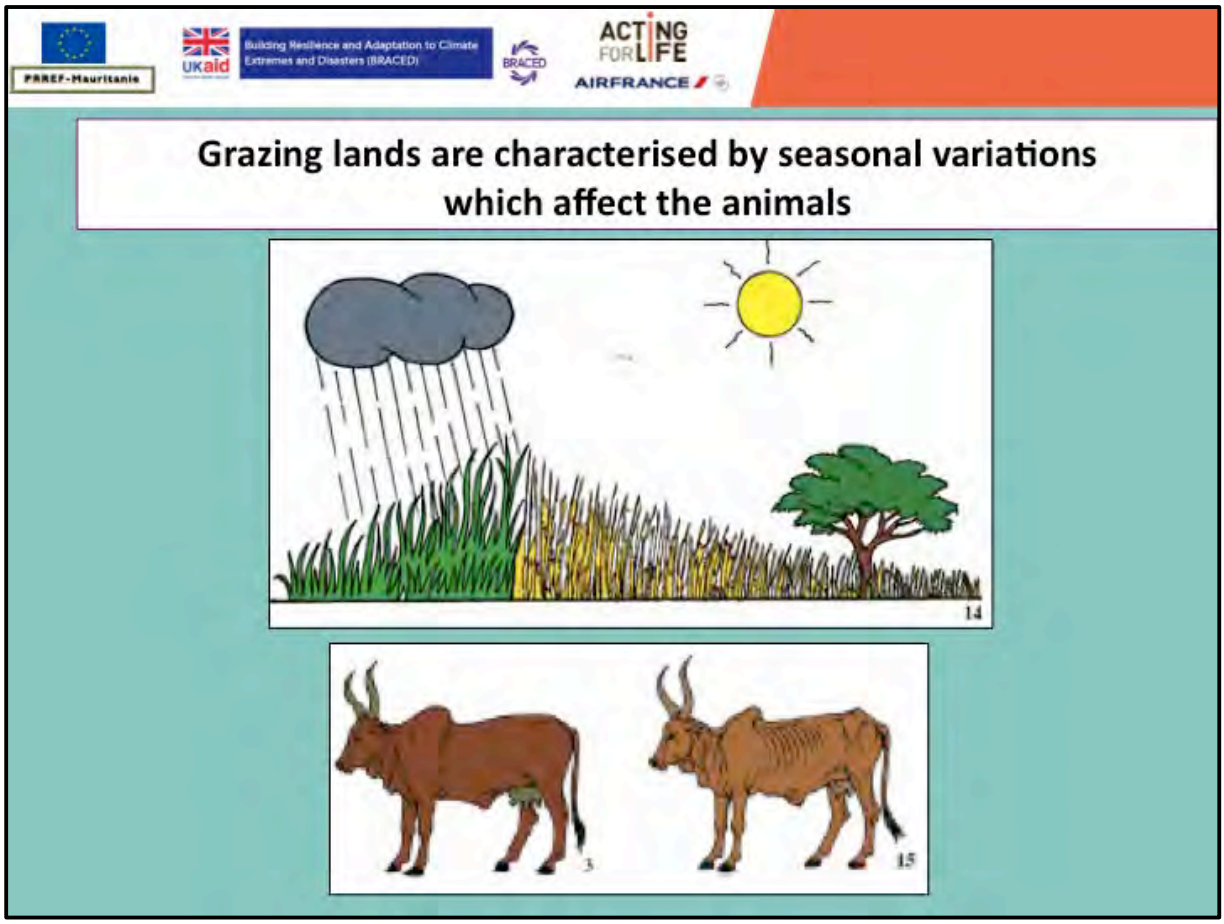

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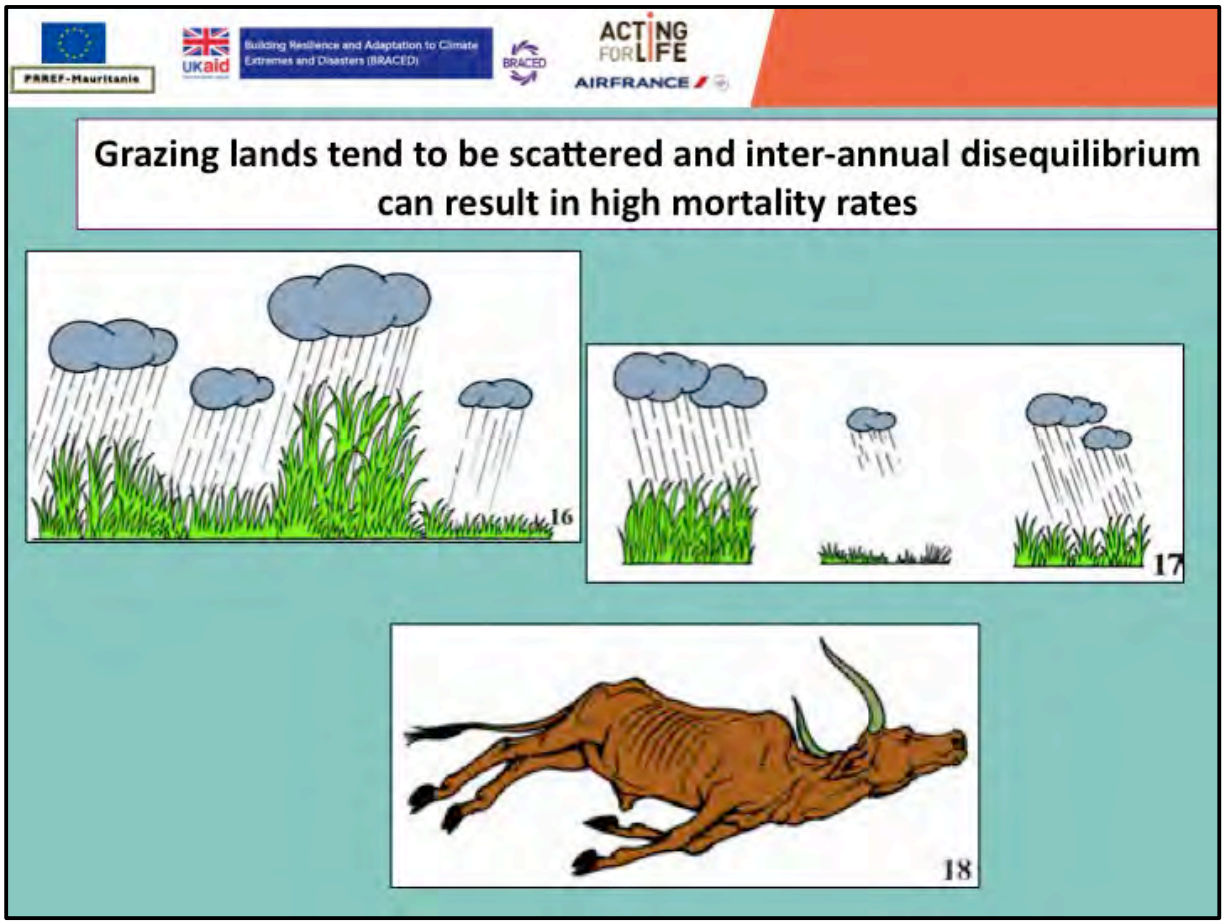

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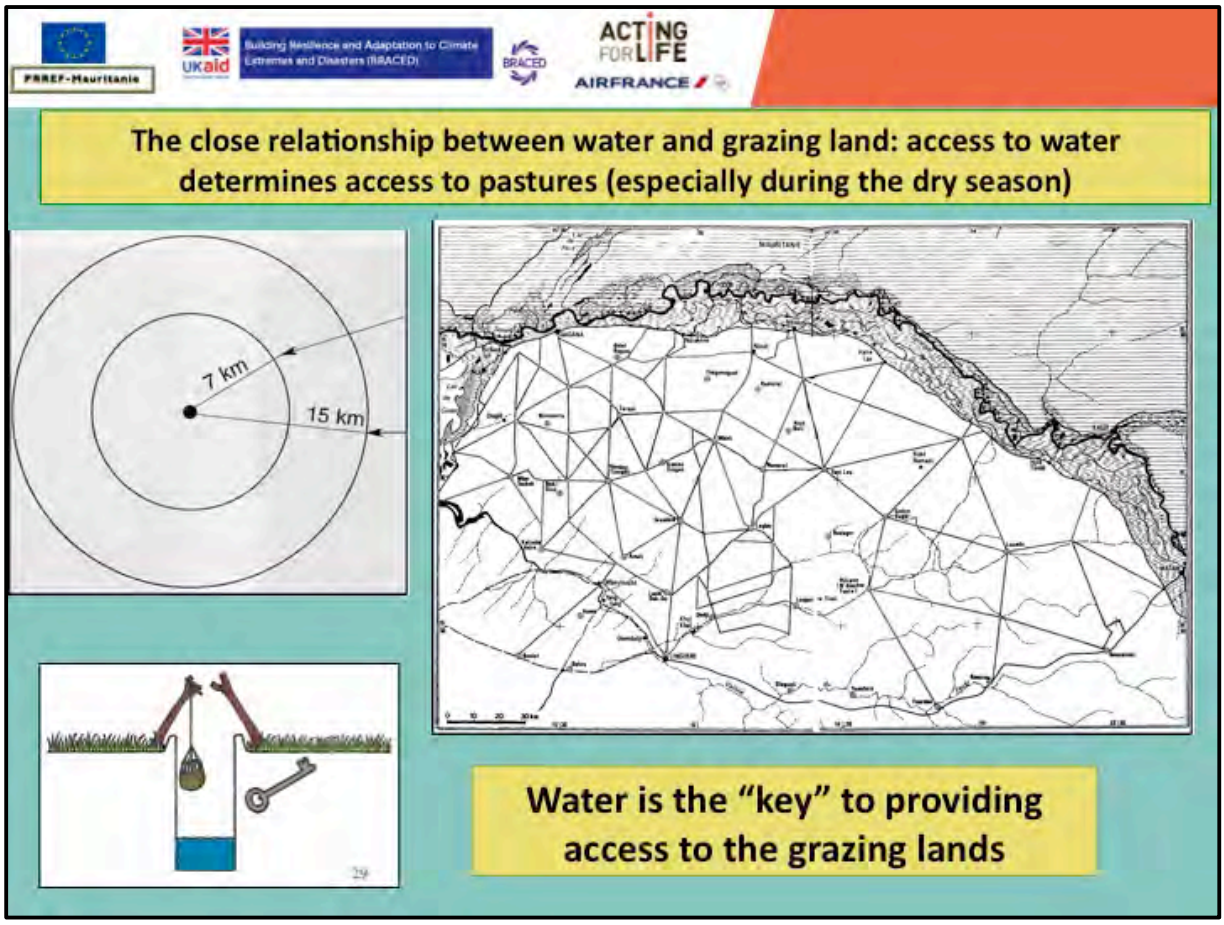

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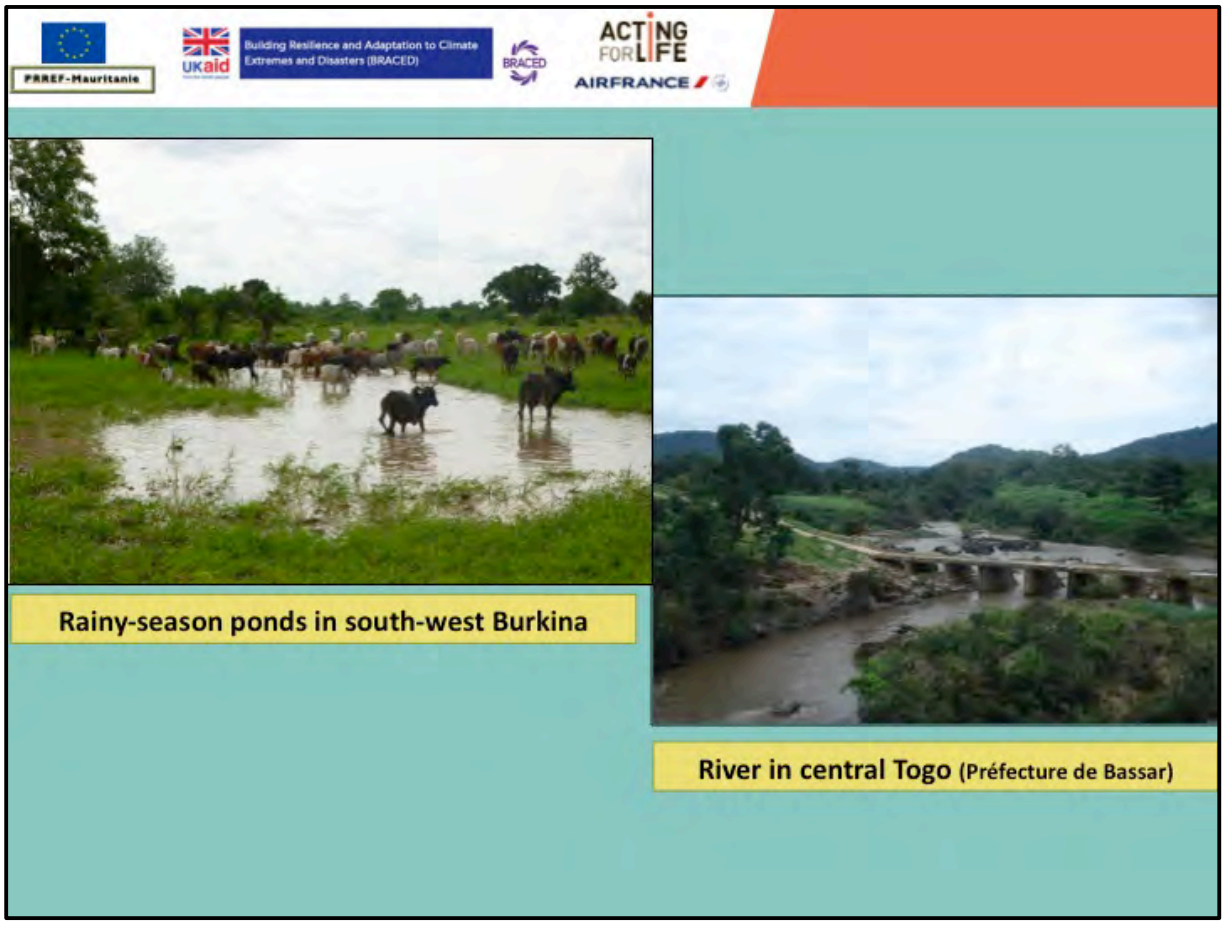

Introduction to debate 2: slide 14

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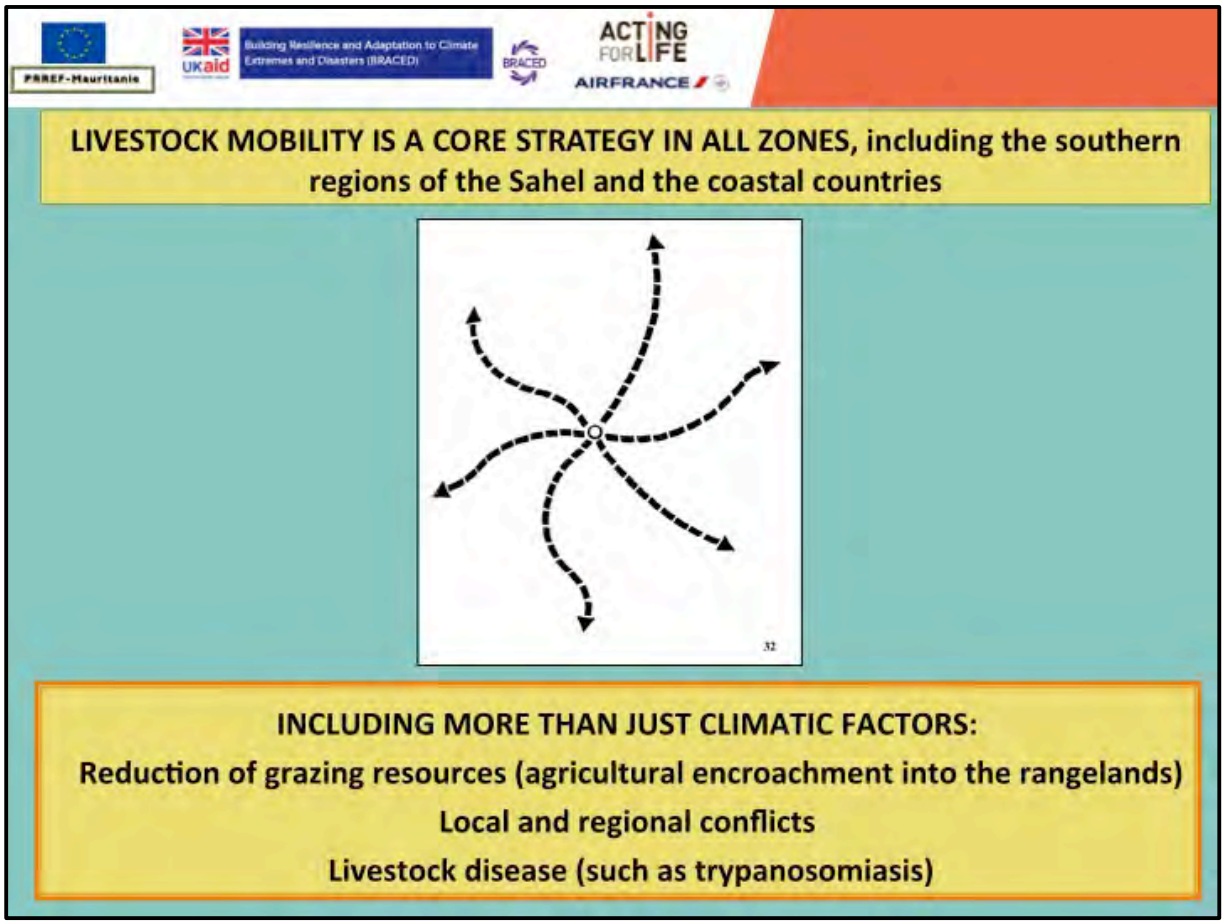

Introduction to debate 2: slide 18

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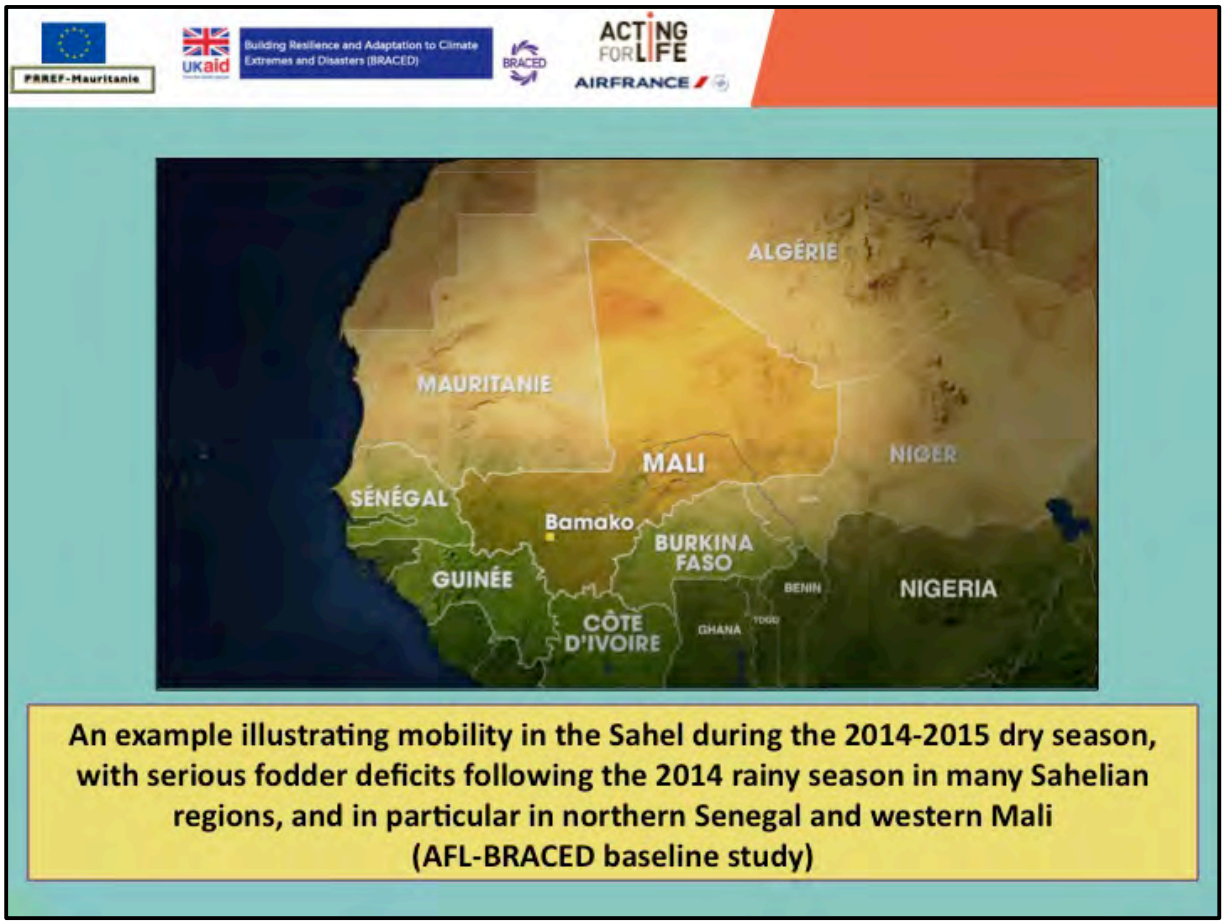

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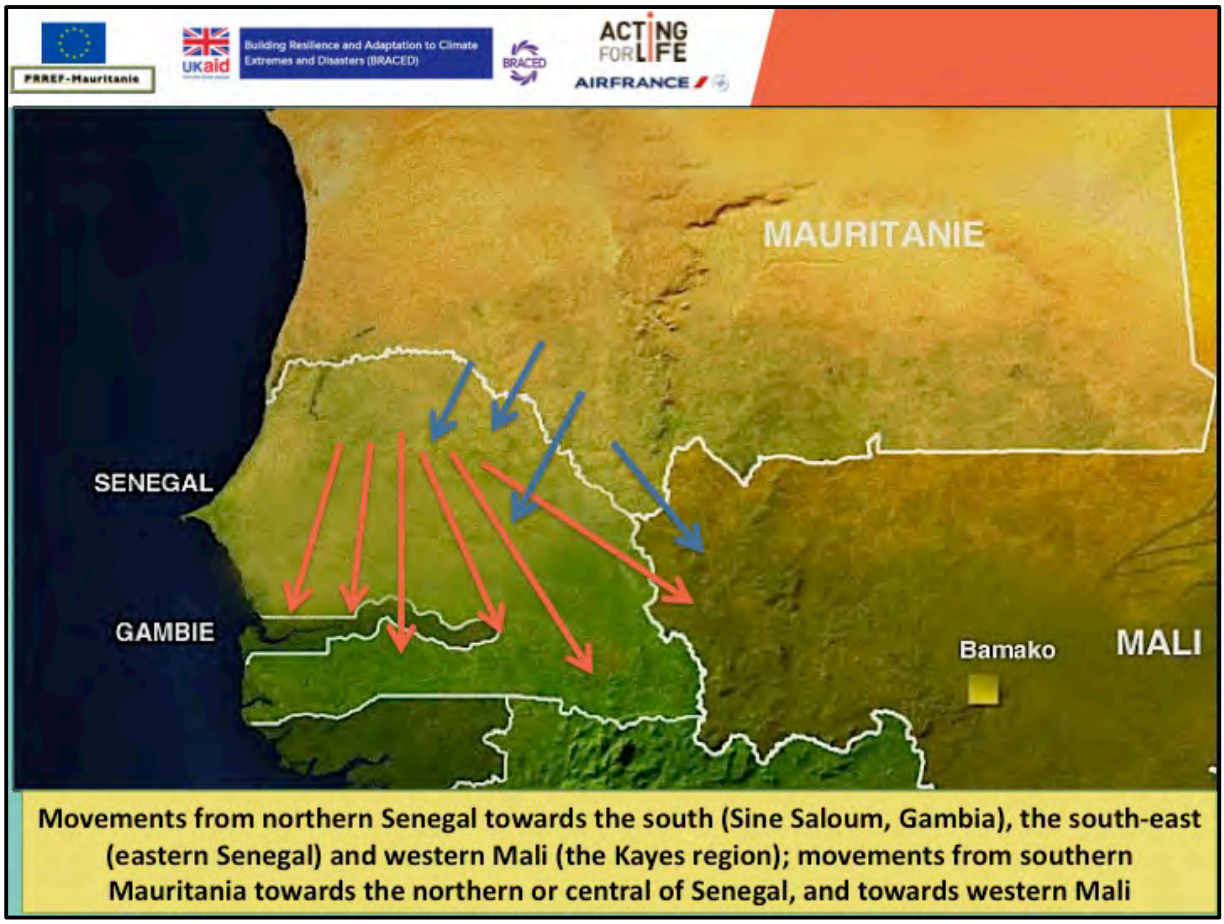

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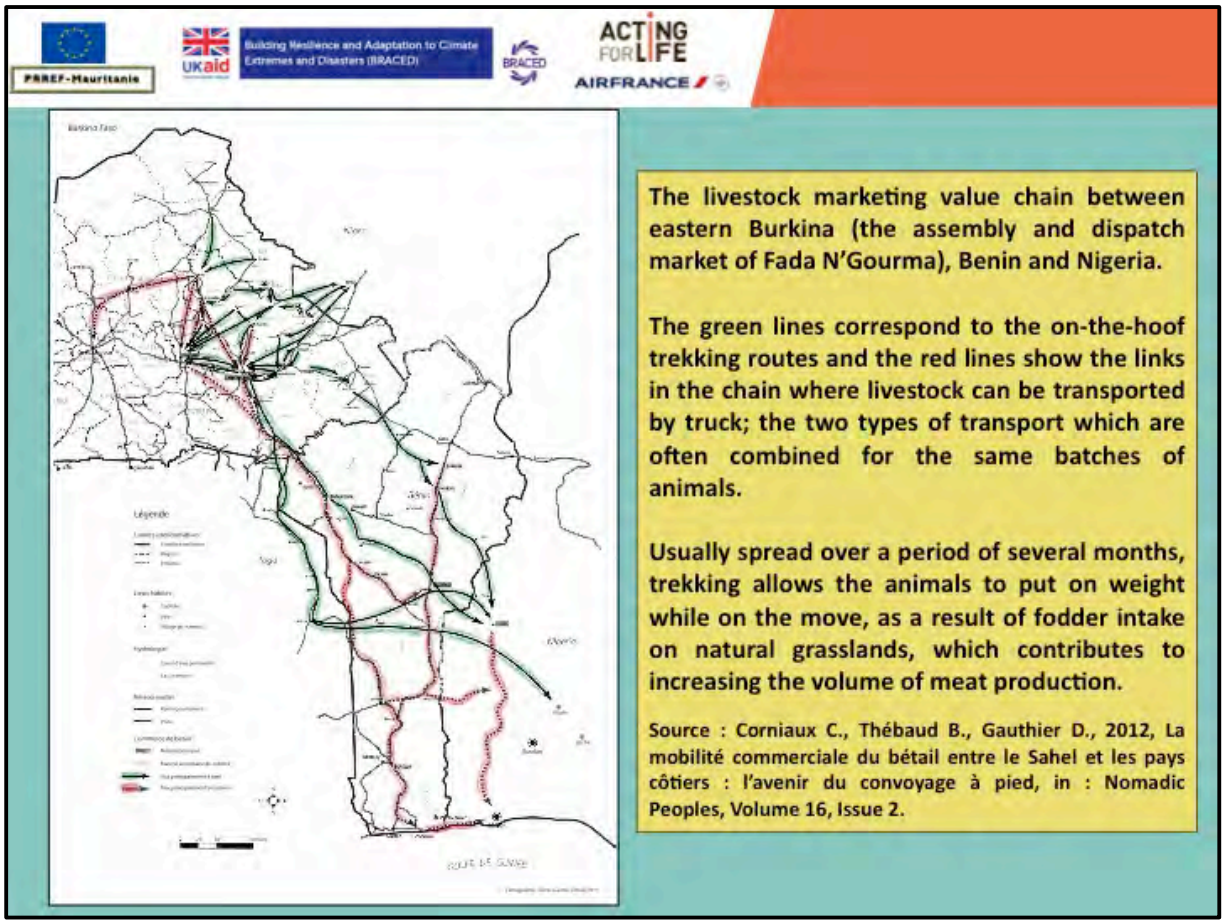

Introduction to debate 2: slide 23

Introduction to debate 2: slide 24

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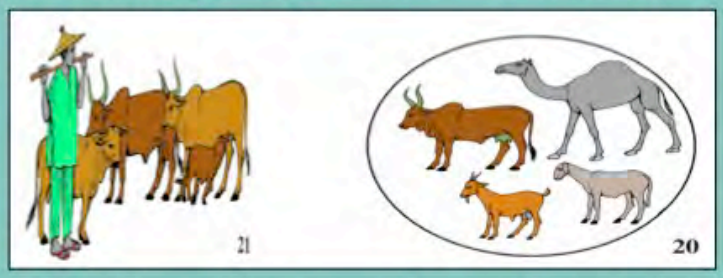
Herds are made up of different species, also varying according to age and sex structures



AVERAGE STRUCTURE OF CATTLE HERDS IN PASTORAL ZONES (YEARS 1960's)

Herd Structure by Sex	Number of males (as % of herd)	Number of females (as % of herd)	Number of adult females (as % of herd)
	26 %	74 %	47 %

Source : Étude démographique en milieu nomade, 1966, SEDES

Introduction to debate 2: slide 25

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(Gobra zebu, nothern Senegal, photo B. Thébaud, AFL-NCG mission, November 2015)

THE NATURAL GROWTH RATE OF LARGE LIVESTOCK IS SLOW: Around 3 % per annum

Introduction to debate 2: slide 26

It can take a very long time to rebuild a herd of large livestock

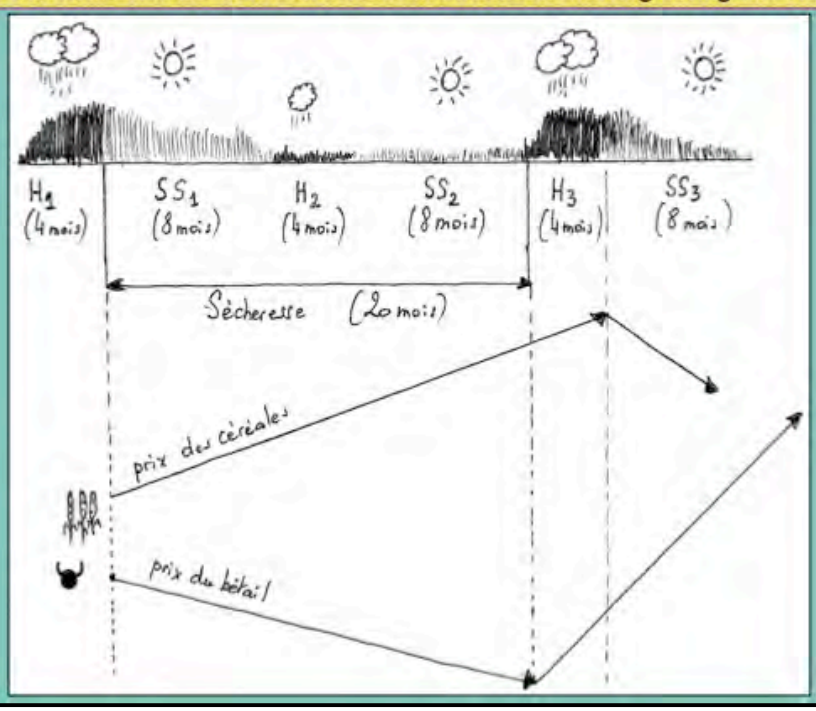
Estimated Time for Cattle Herd Reconstitution after Varying Levels of Drought Loss

% losses among herd	Number of Years for herd reconstruction
20%	3
30%	10
40%	12
50%	21
60%	30
70%	43
80%	61
90%	85

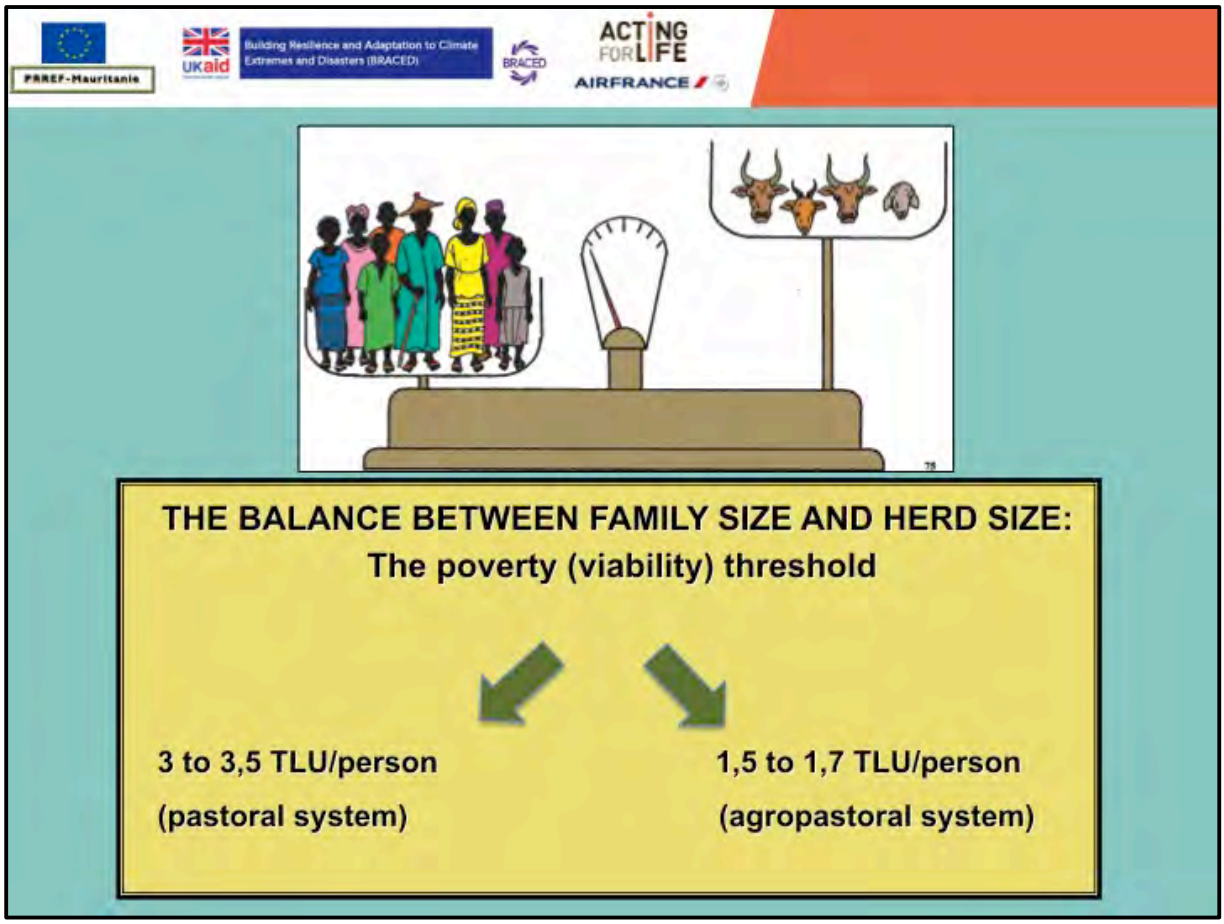
Source : **TACHER G.**, 1975, Notes sur la démographie bovine au Sahel, Rev. El. Méd. vét. Pays Trop., Institut d'Elevage et de Médecine Vétérinaire des Pays Tropicaux (IEMVT), 28(4):547-595, Maisons-Alfort, cité par **TOULMIN C.**, 1986, Livestock Losses and Post-Drought Rehabilitation in Sub-Saharan Africa, Working Paper n° 9, International Livestock Centre for Africa (ILCA), Addis Abeba, 105 p

Introduction to debate 2: slide 27

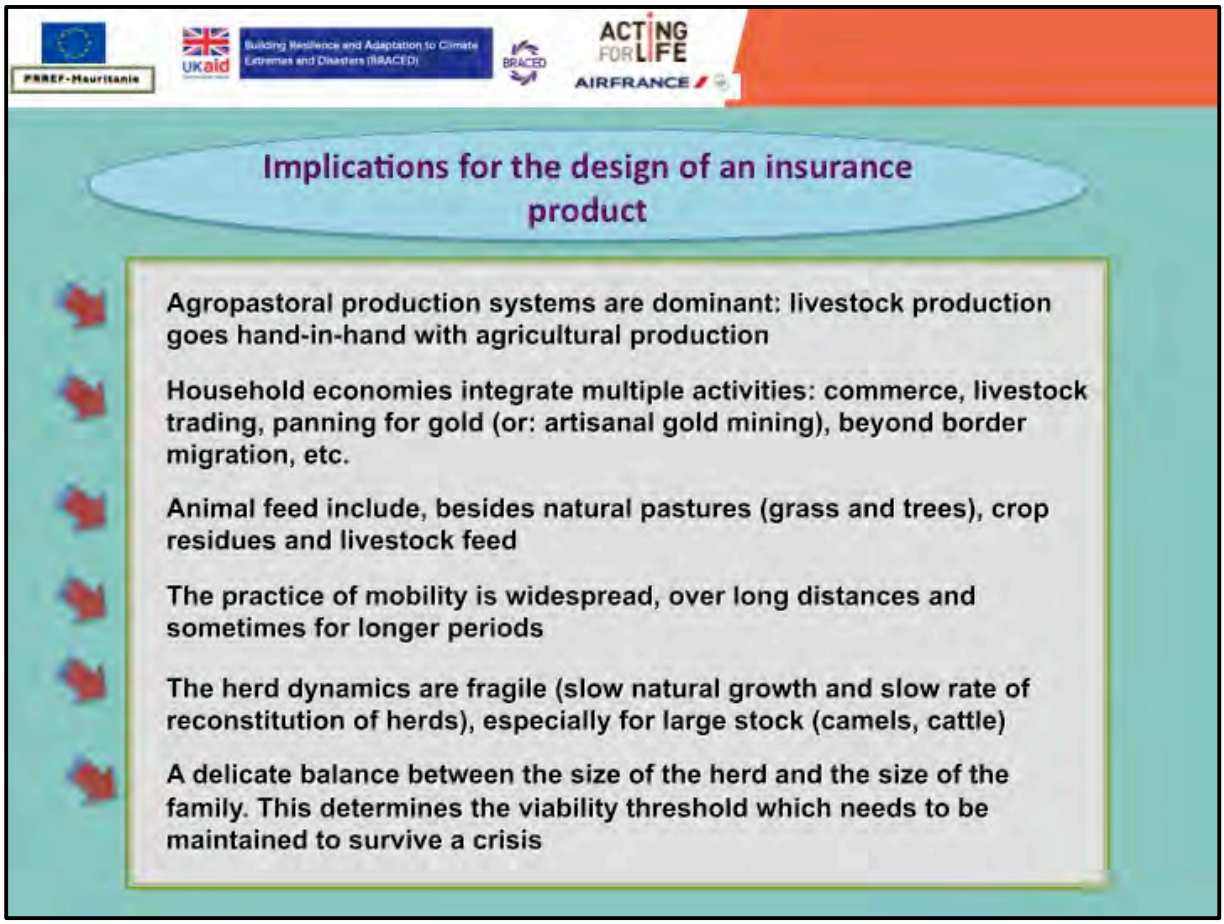
MOBILITY AS AN ECONOMIC STRATEGY TO MANAGE THE EFFECTS OF A DROUGHT: being mobile and hence saving the life of the animals allows a herder to come back onto the market in a strong position as a result of the terms of trade between cereals and livestock evolving during and after a drought



Introduction to debate 2: slide 28

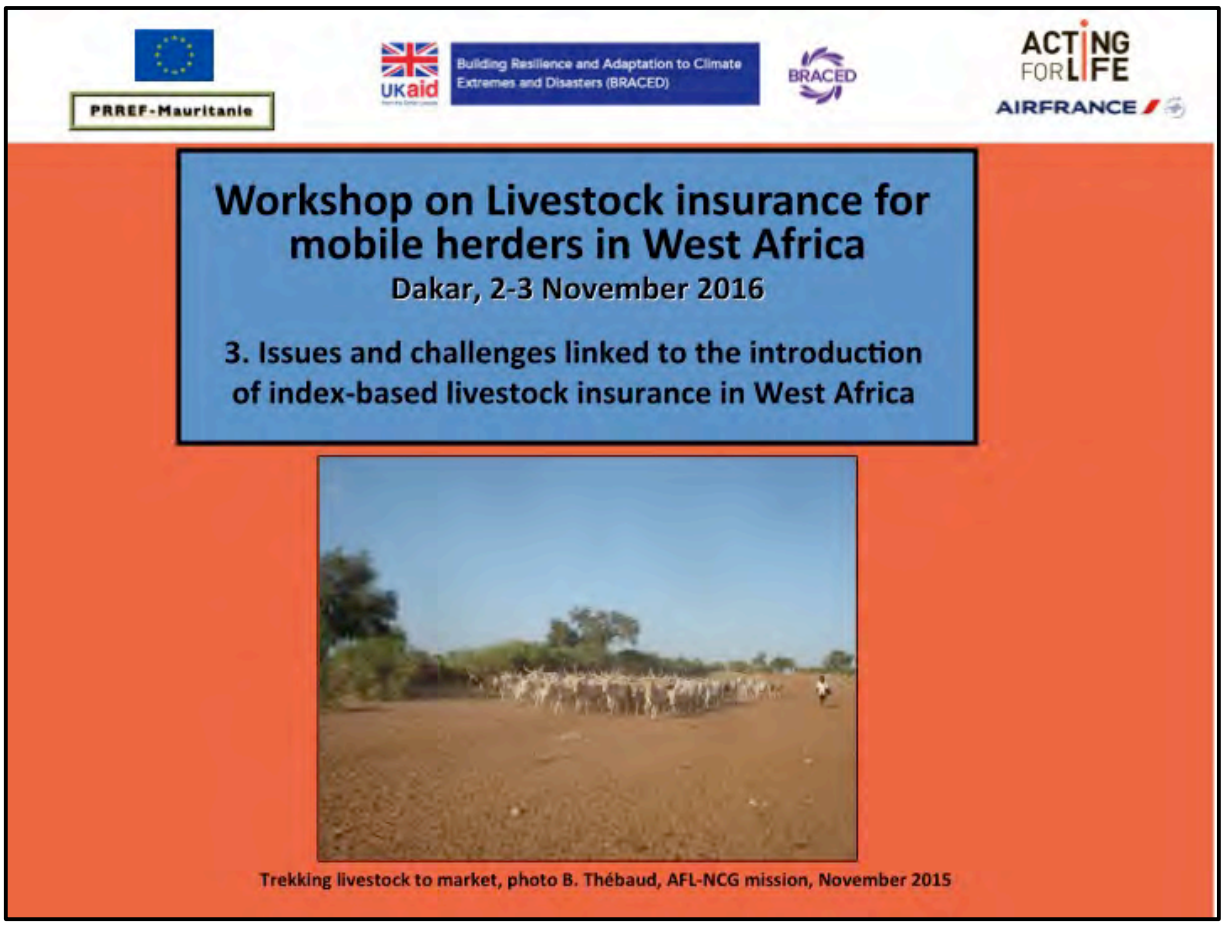


Introduction to debate 2: slide 29

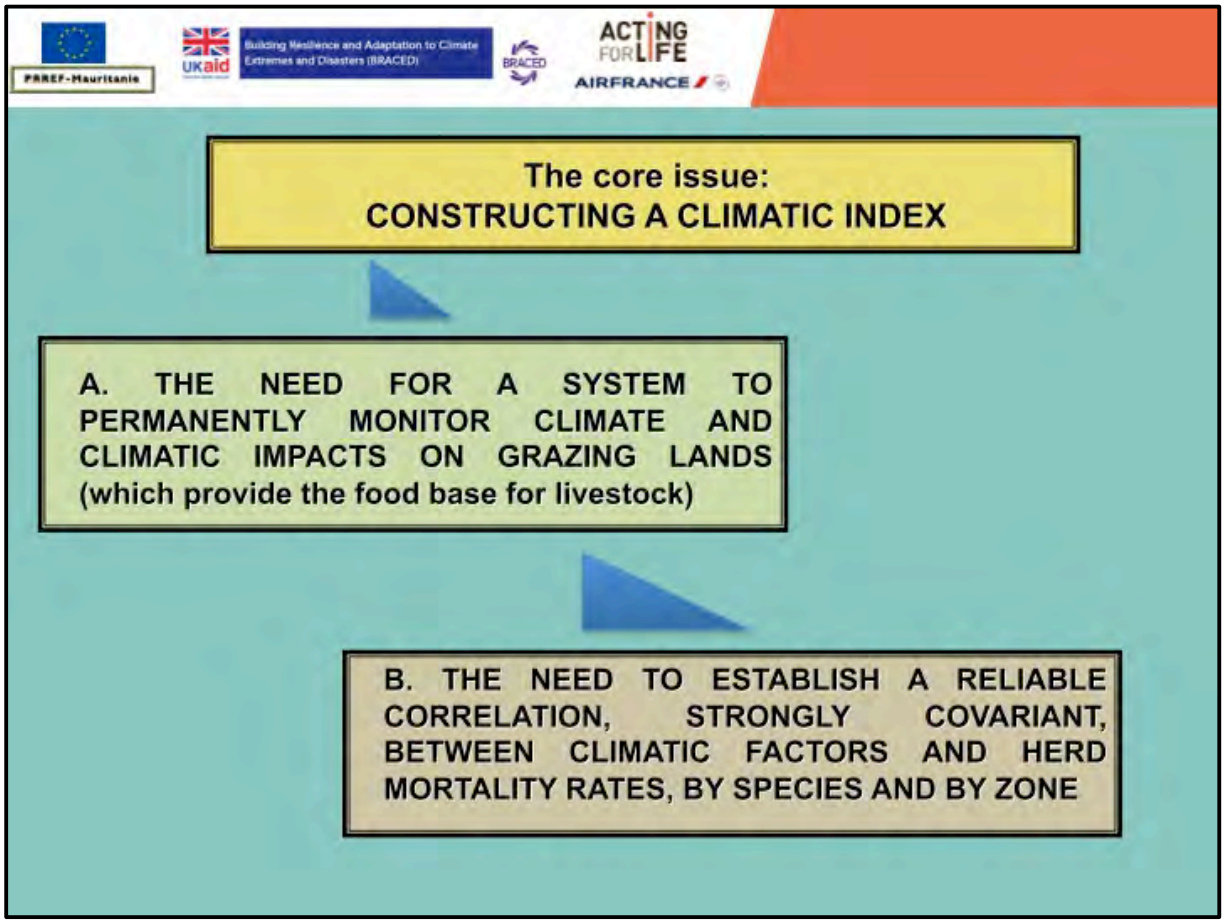


Introduction to debate 2: slide 30

ANNEX 5. INTRODUCTION TO DEBATE 3: Issues and challenges linked to the introduction of index-based livestock insurance in West Africa



Introduction to debate 3: slide 1



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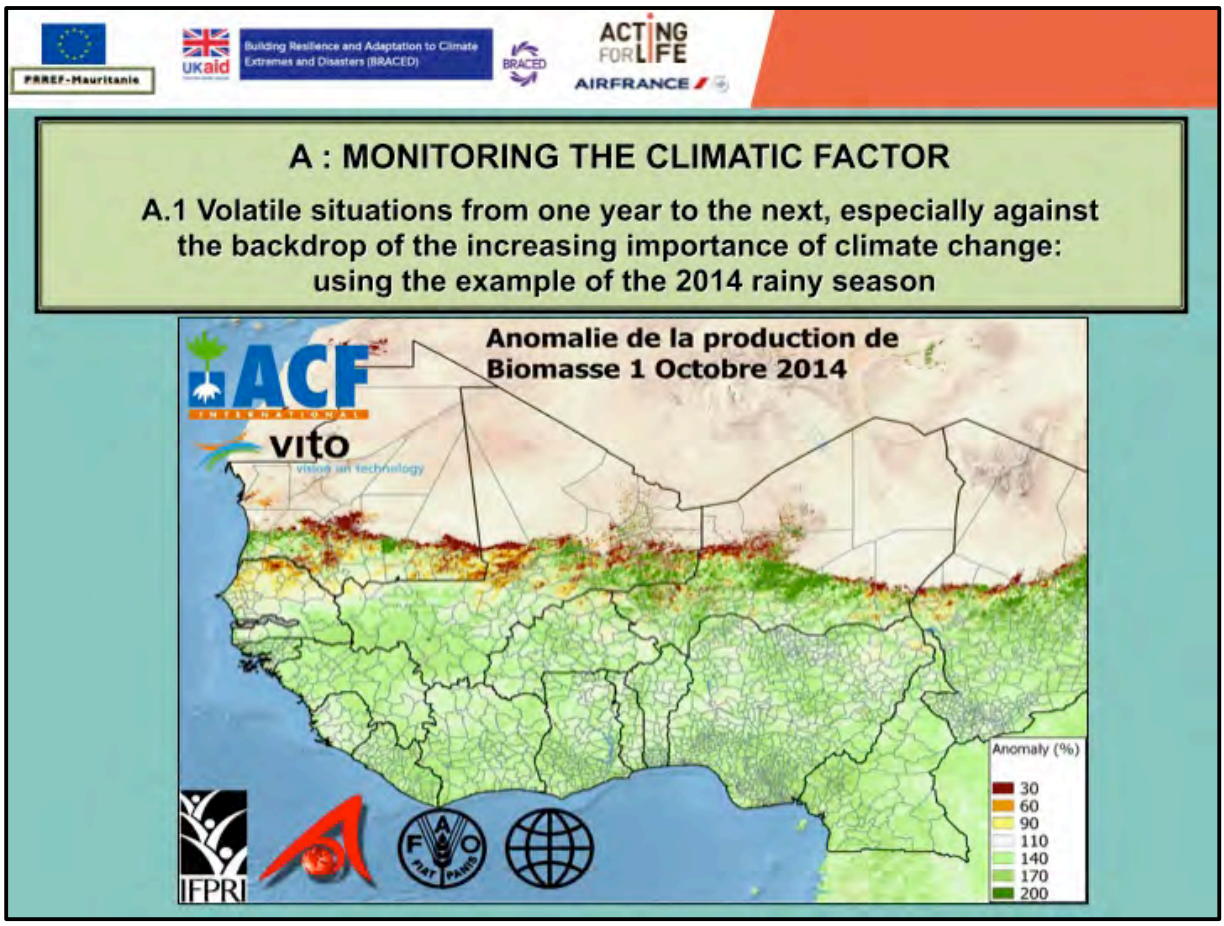

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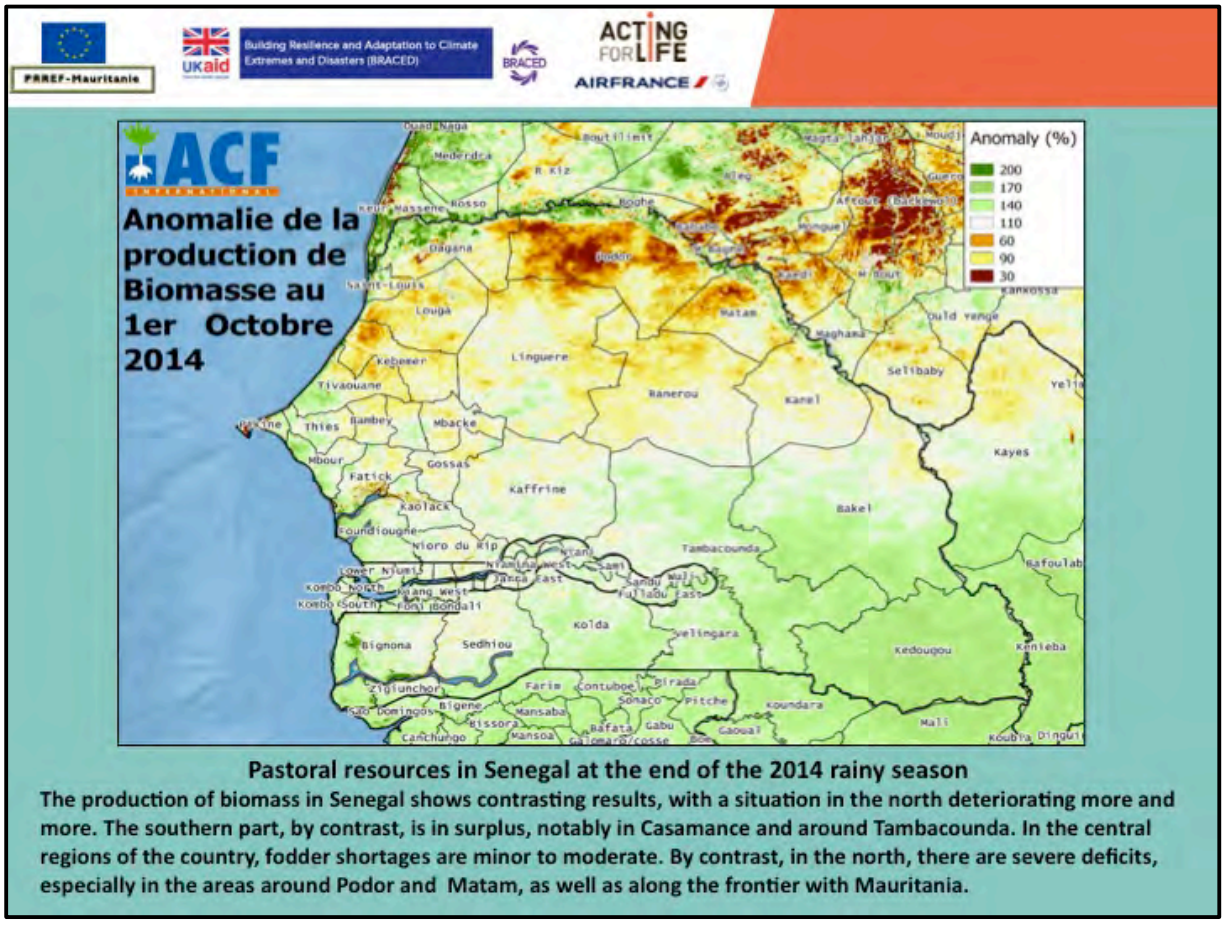

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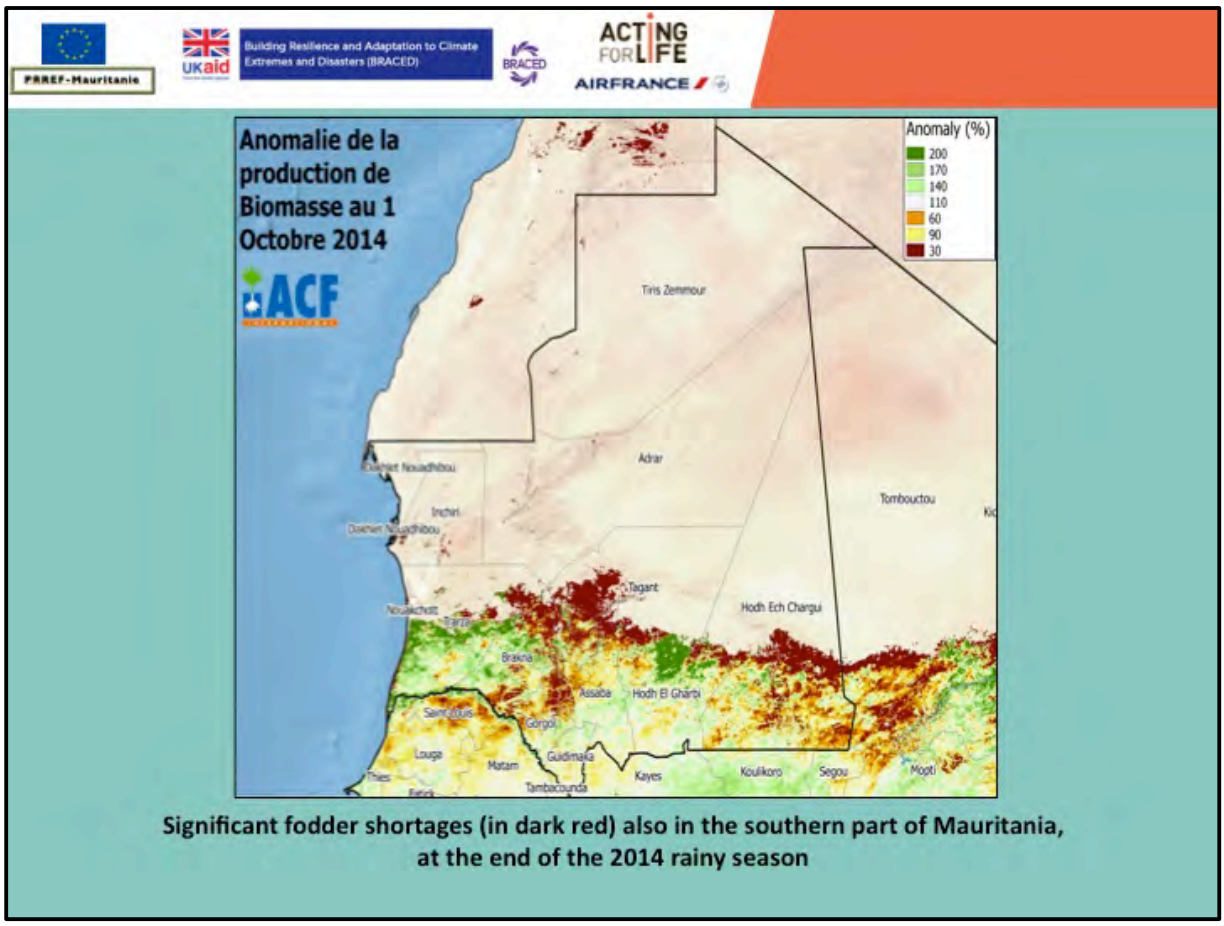

Introduction to debate 3: slide 5

Introduction to debate 3: slide 6

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A.2 Inter-annual disequilibriums and intra-regional "drought pockets": the example of Niger

Introduction to debate 3: slide 7

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REGIONAL DISTRICTS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Years of deficits
Agadez	152.650	129.948	34.664	128.971	-98.890	125.753	94.824	430.682	-222.709	-212.533	444.890	-263.222	1.294.530	-29.935	5
Diffa	-1.533.583	-1.829.517	-2.078.035	-1.404.197	-2.380.057	-744.691	-1.508.316	305.602	-915.870	-2.251.421	284.294	-1.069.719	856.184	-1.121.035	11
Dosso	-95.952	390.718	-151.637	-71.509	-414.534	404.540	1.354.021	-75.563	-479.281	-1.159.377	-297.334	-330.648	-513.784	-609.119	11
Maradi	228.511	27.680	92.821	89.842	-261.705	909.901	313.487	-526.379	-452.862	-2.710.110	1.058.784	-1.086.105	-359.128	-1.186.167	7
Tahoua	191.880	742.167	-35.442	677.454	-661.102	-275.799	753.836	741.871	-1.335.458	-2.393.341	1.467.094	-2.290.288	829.927	-1.316.648	7
Tillaberi	-784.212	1.604.928	380.507	793.420	-611.884	527.140	783.124	377.131	-633.442	-3.629.642	-2.099.515	-2.769.227	-1.132.939	-2.099.619	8
Zinder	369.395	253.739	425.477	1.404.197	-137.708	978.718	1.064.526	-147.828	-1.236.891	-3.670.019	507.743	-2.309.329	883.002	-202.681	6
Niamey	-51.230	-55.940	-56.340	-59.878	-52.965	-37.969	-66.708	-99.144	-76.609	-115.566	-120.030	-103.870	-89.904	-145.172	14
NIGER	-1.827.841	1.319.663	-1.387.964	1.412.600	-4.642.219	1.887.591	2.788.794	1.006.373	-5.353.140	-16.137.329	1.245.926	-10.222.408	1.767.888	-6.710.376	7

Ministry of Livestock, annual evaluations of the pastoral situation 2000-2009, Niamey, Niger (volumes of biomass in tons of dry matter). Negative values for years with fodder deficits highlighted.

Over a 14 years' period, all districts have experienced at least 5 droughts. Some areas are in chronic deficit (Diffa, 11 years). Drought episodes can be restricted to several regional districts or have a national scale, such as in 2004, 2008, 2009, 2011 and 2013.

Ultimately, a pastoral drought situation happens every year, or, at best, every second or third year. Consequently, is it really possible to insure a chronic risk using an index-base where the cost to design, implement and monitor will be very high?

Introduction to debate 3: slide 8

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A.3 The financial and technical capacity to monitor climatic factors and indicators: rainfall and biomass

Example of a rain-gauge in northern Niger, with readings done by herders (unpaid, on a voluntary basis). In bad shape, the rain gauge is situated within the bounds of a concession, which can contribute to skewed readings, as the gauge should rather be sited in an open space, away from buildings.

Introduction to debate 3: slide 9

DFID Department for International Development

UKaid

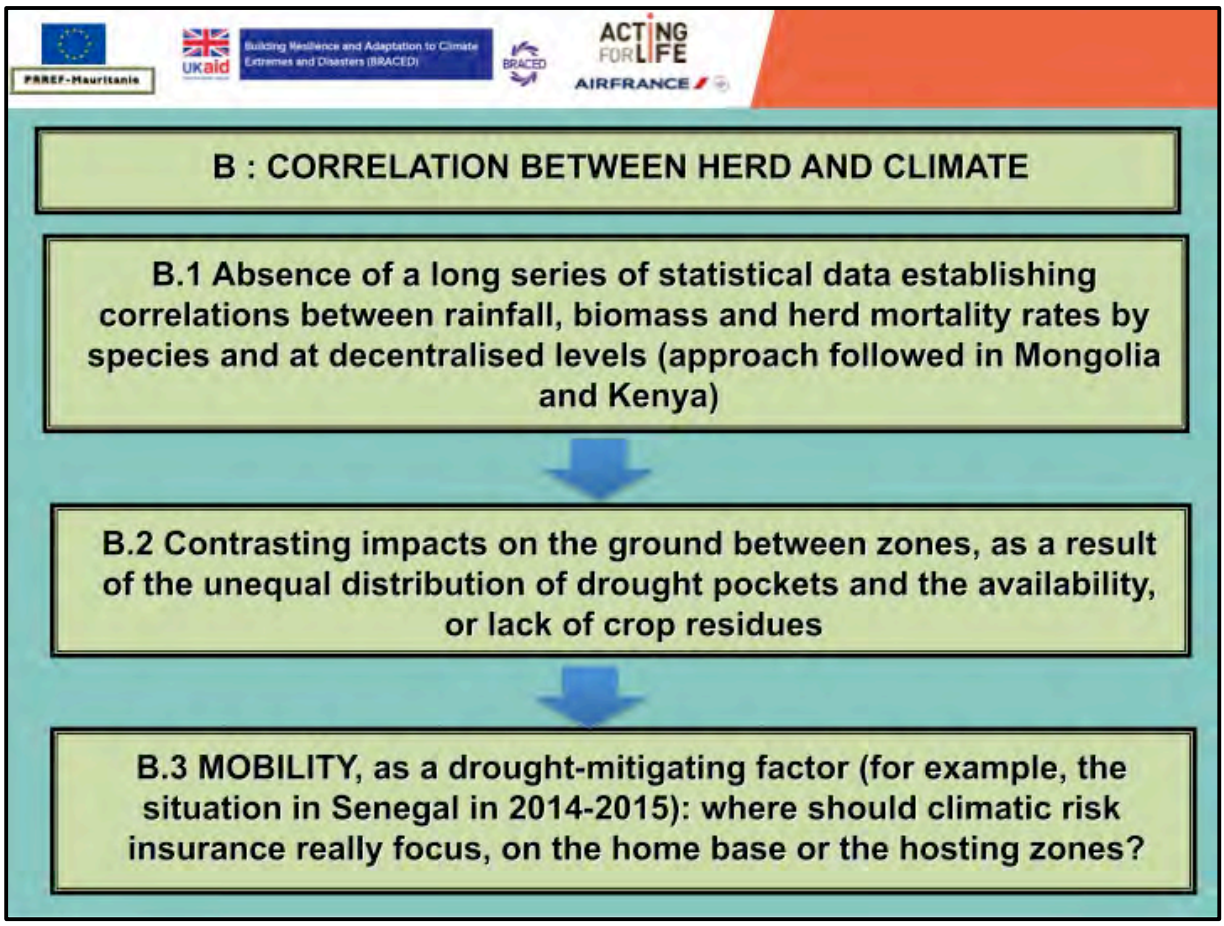
ACTING FOR LIFE AIRFRANCE

The distribution of the biomass and the diversity of the fodder resources: the need to include shrubs and tree covers, crop residues, agro-industrial by-products, pastoral enclaves in the south

The limitations of satellite imagery and regional analyses (AGRHYMET, OSS): type, quantity and quality of the different resources

The frequent lack of ground-truthing (transects, estimates of biomass, regular monitoring of experimental test sites)

Introduction to debate 3: slide 10



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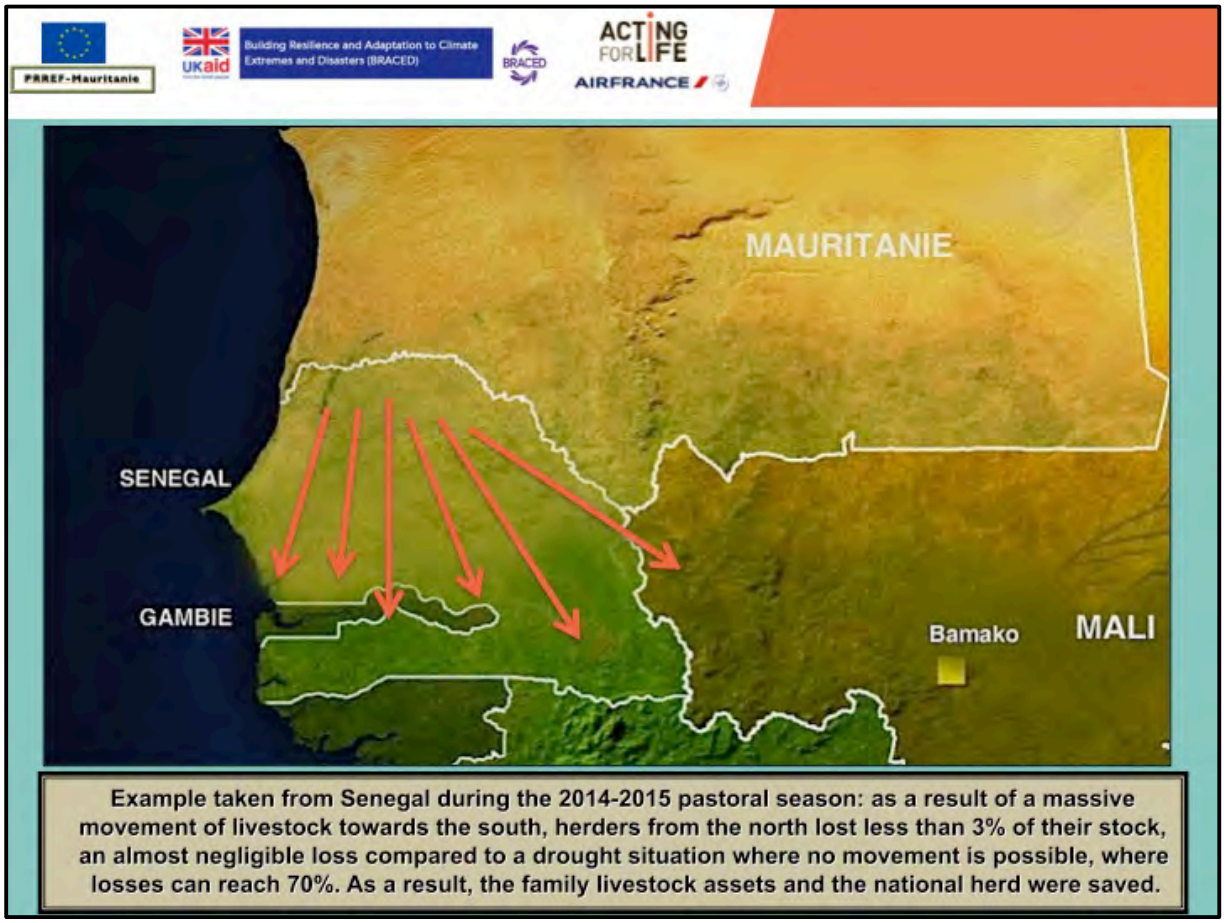

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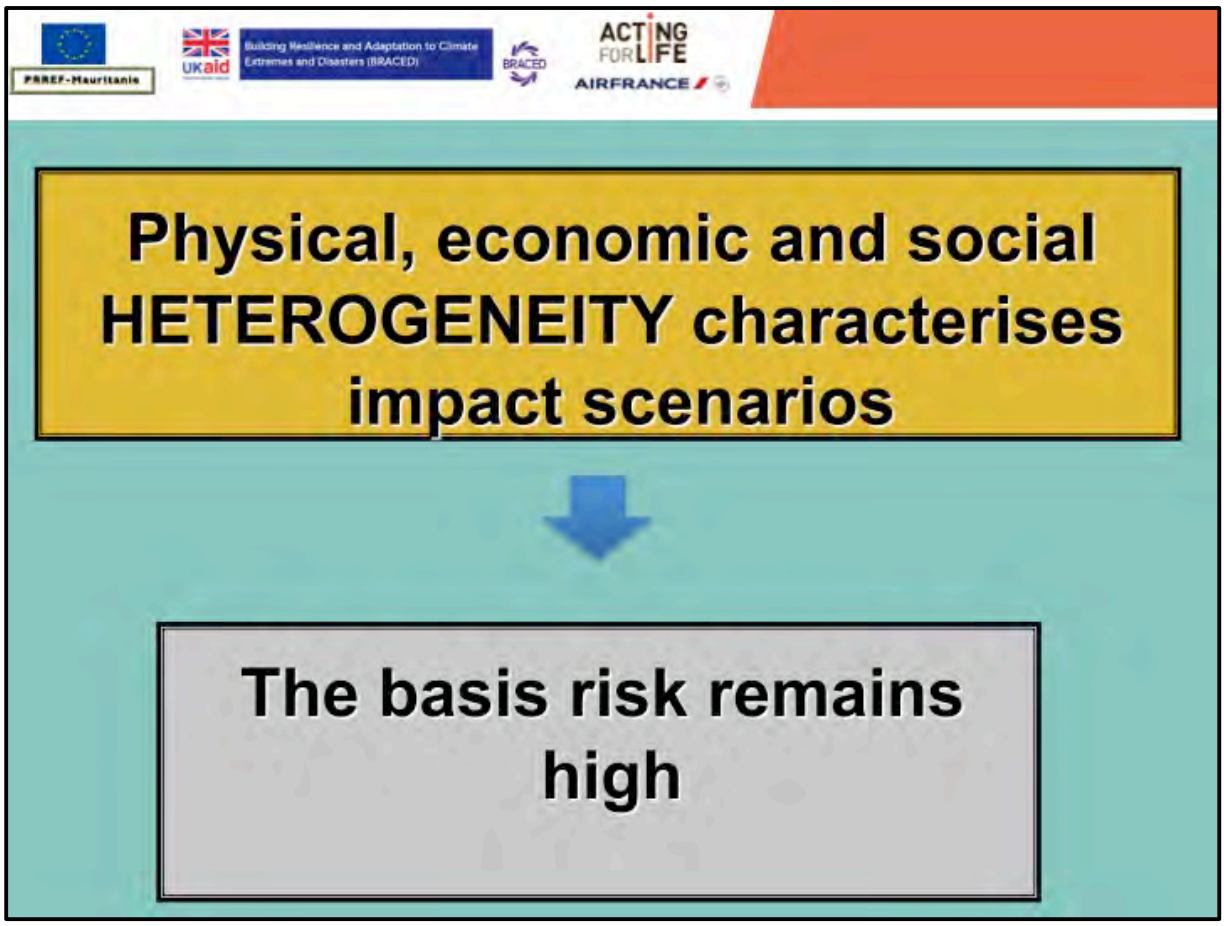

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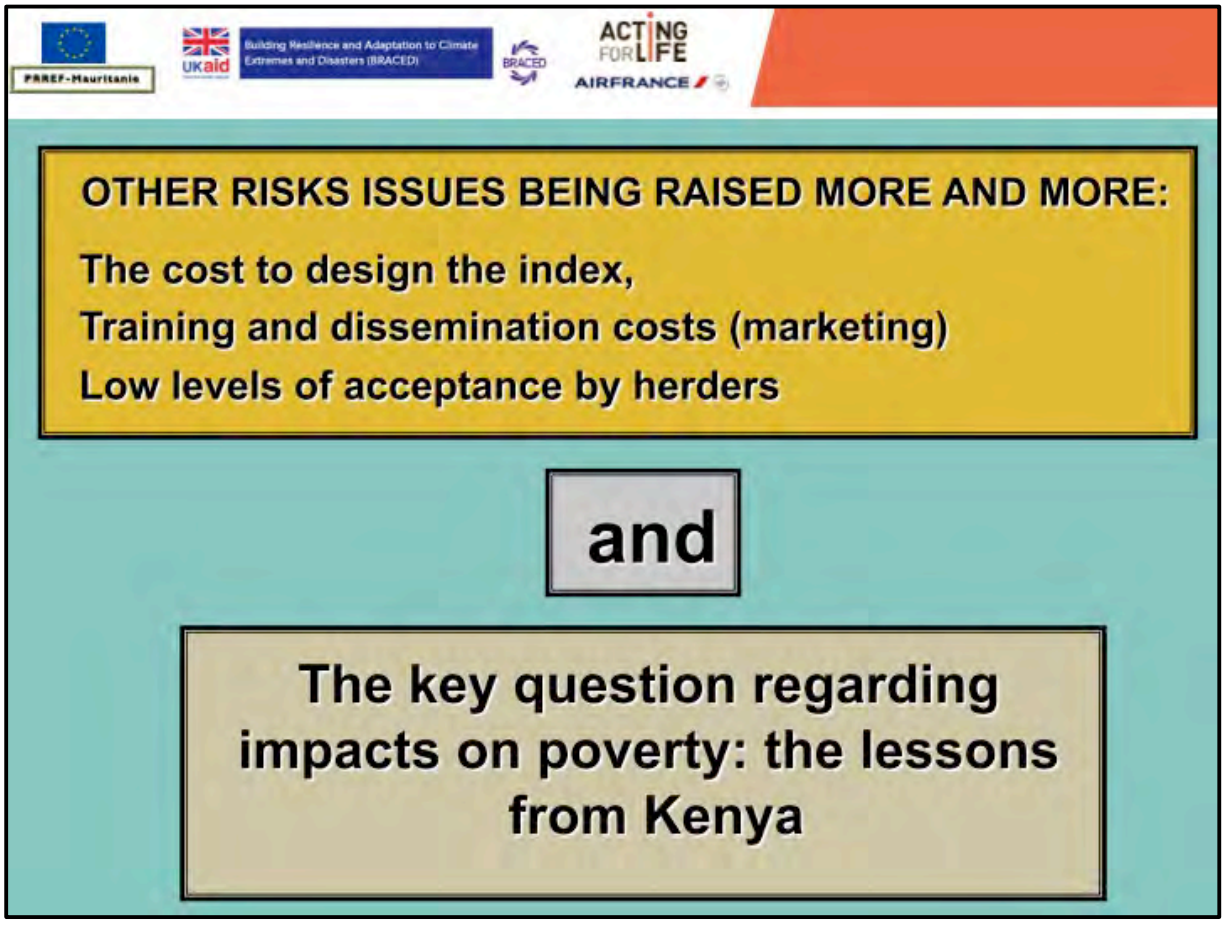

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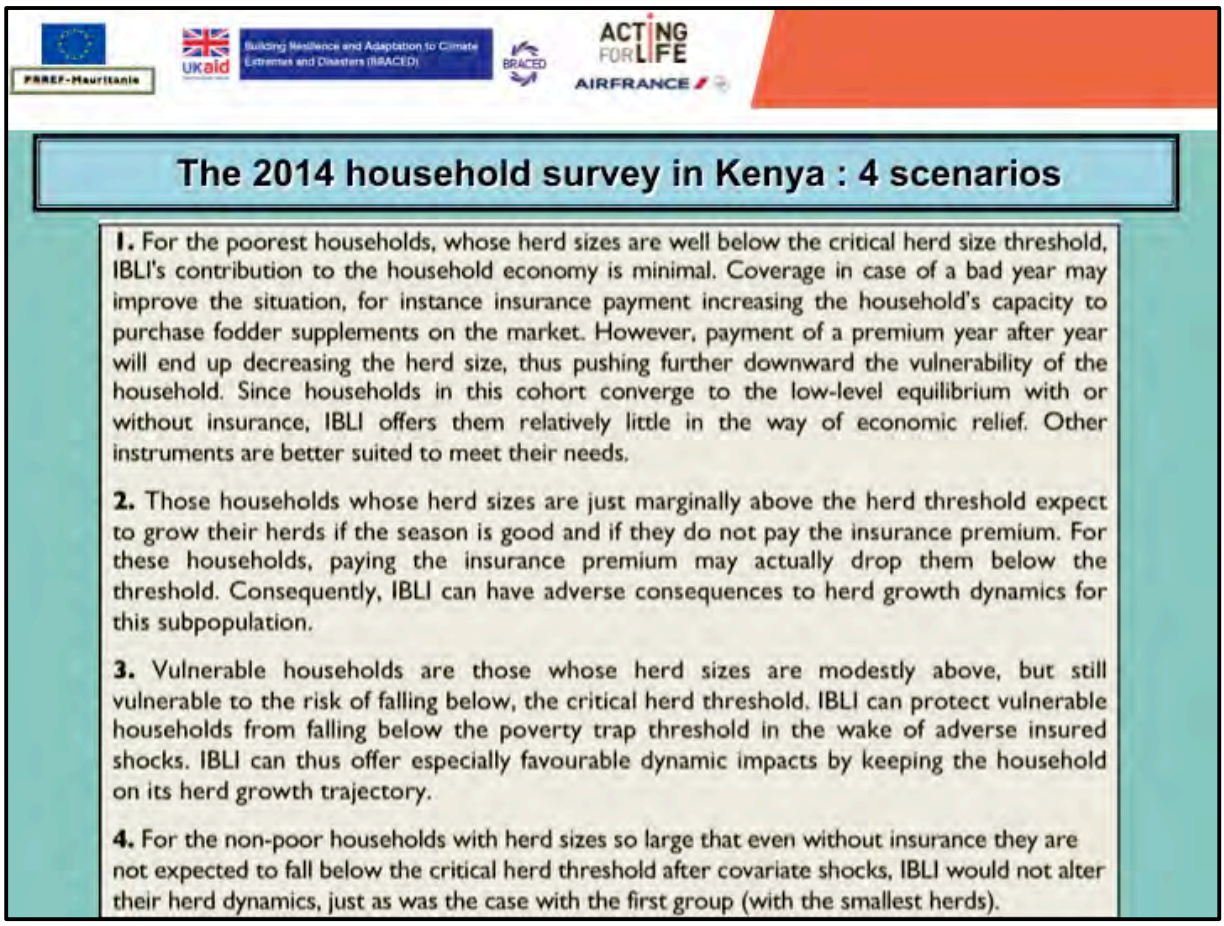

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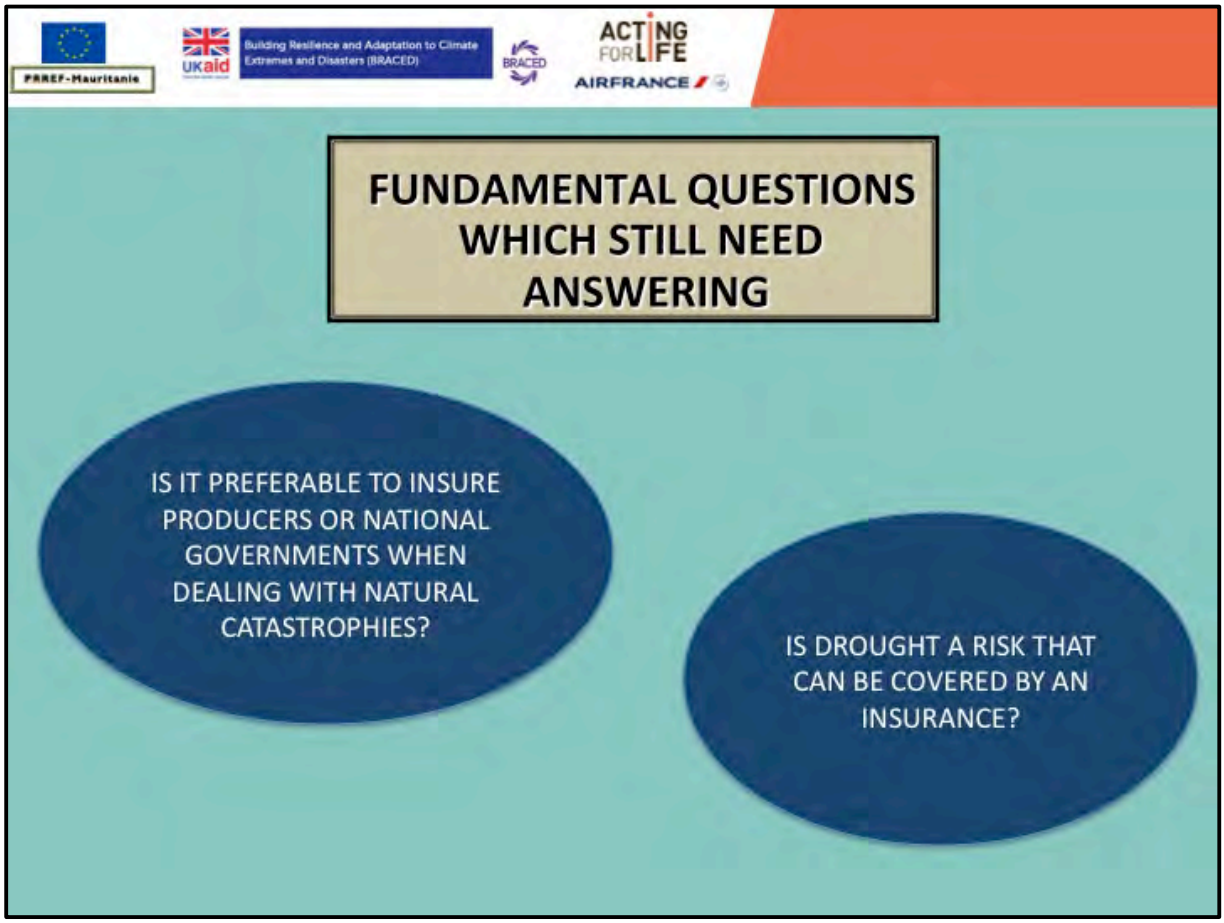

Introduction to debate 3: slide 16

ANNEX 6. INTRODUCTION TO DEBATE 4: A different perspective on the risks faced by mobile herders

PRREF-Mauritanie

Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)

ACTING FOR LIFE AIRFRANCE

Workshop on Livestock insurance for mobile herders in West Africa

Dakar, 2-3 November 2016

4. A different perspective on the risks faced by mobile herders

Transhumant herders crossing a river in Togo, photo Gilles Coulon/Tendance Floue for AFL, 2016

Introduction to debate 4: slide 1

PRREF-Mauritanie

Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)

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The AFL-BRACED 2014-2015 baseline survey: conducted in the 5 countries covered by the project: Mauritania, Senegal, Mali, Niger, Burkina Faso

The AFL-BRACED project (UK-Aid) is built around two major trans-boundary zones. The western territory covers strategic transhumance routes connecting southern Mauritania (Trarza, Braka, Gorgol, Guidimaka, Hodh-el-Gharbi and Hodh-el-Chargui Provinces), with north-western Mali (Kayes, Koulikoro) and Senegal (Regions of Saint-Louis, Louga, Matam, Tambacounda). The eastern zone captures important livestock movements departing from northern Mali (Gao Region), continuing to the northern and eastern regions of Burkina (Dori, Djibo, Fada N'Gourma), after intersecting with transhumance routes originating from western Niger (Tillaberi Province) .

Introduction to debate 4: slide 2

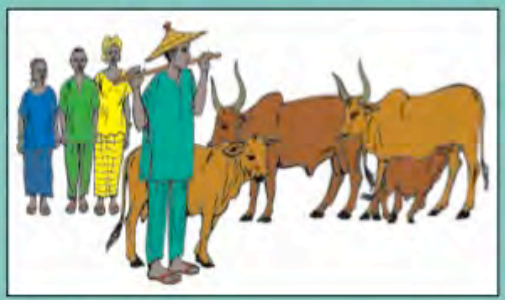
THE SURVEY: TWO OBJECTIVES

1. Establish a baseline in order to monitor 5 indicators of resilience (for example, livestock sales, herd size in relation to family size, etc.)

2. Provide qualitative and quantitative data both on the magnitude of animal movements and on what happens during a transhumance, taking as example the 2014-2015 transhumance

Introduction to debate 4: slide 3

A thorough investigation and a fresh look at livestock transhumance



386 families and 131 women
Total size of the herd accompanying these families on transhumance (figures rounded up): 39 501 cattle, 47 310 sheep and 15 736 goats

A study benefitting from the joint support of United Kingdom and the European Union, through a co-financing established between the AFL/BRACED Project (UKAid) and the *Projet de Renforcement de la Résilience de l'Economie Familiale grâce à la Productivité de l'Elevage* (PRREF-UE), implemented in the southern and eastern parts of Mauritania

Introduction to debate 4: slide 4

The 8 steps of the Household Questionnaire

- **STEP 1. THE FAMILY AND ITS MAIN ACTIVITIES:** its structure and its productive activities, in addition to livestock production
- **STEP 2. THE CLIMATIC FACTOR:** perception by the households of the current climatic situation
- **STEP 3. THE COURSE OF THE LAST TRANSHUMANCE** (2014-2015)
- **STEP 4. INFORMATION NEEDS AND REQUIREMENTS**
- **STEP 5. THE HERD**
- **STEP 6. ANIMAL HEALTH**
- **STEP 7. SALES AND EXPENSES** measuring the contribution made by the transhumants in the zones through which they pass
- **STEP 8. MEMBERSHIP OF ASSOCIATIONS**

Introduction to debate 4: slide 5

FINDING 1: Large numbers of animals leaving on transhumance, as well as animals left behind in the home base

Numbers of animals by species on transhumance and remaining at the home base

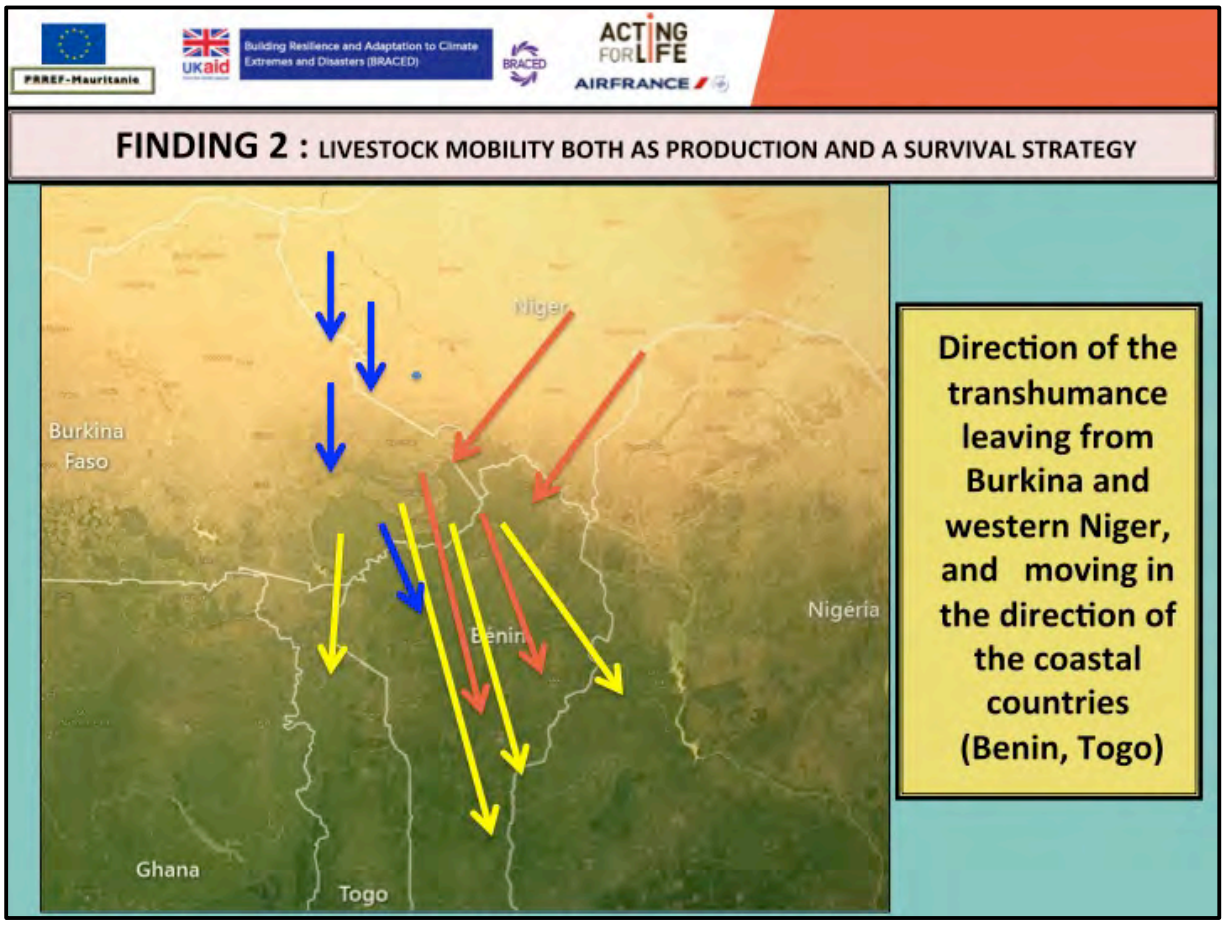
	CATTLE	CAMELS	SHEEP	GOATS
Animals on transhumance	38 141	937	46 822	15 592
Animals remaining behind	4 898	211	6 081	9 211
% on transhumance	89%	82%	89%	63%

Introduction to debate 4: slide 6

Numbers of animals by species on transhumance and remaining at the home base
(Senegal, Mauritania and Burkina Faso)

SENEGAL				
SPECIES	On transhumance	Remaining behind	Total herd size before departure	% on transhumance
Cattle	7 355	771	8 126	91%
Camels	2	0	2	100%
Sheep	16 315	1 706	18 021	91%
Goats	3 467	1 269	4 736	73%
MAURITANIE				
SPECIES	On transhumance	Remaining behind	Total herd size before departure	% on transhumance
Cattle	9 849	1 168	11 017	89%
Camels	254	0	254	100%
Sheep	12 523	657	13 180	95%
Goats	2 368	1 234	3 602	66%
BURKINA FASO				
SPECIES	On transhumance	Remaining behind	Total herd size before departure	% on transhumance
Cattle	5 785	1 106	6 891	84%
Camels	54	43	97	56%
Sheep	1 199	1751	2 950	41%
Goats	848	2 478	3 326	25%
(0 goats on transhumance by herders from eastern Burkina)				

Introduction to debate 4: slide 7



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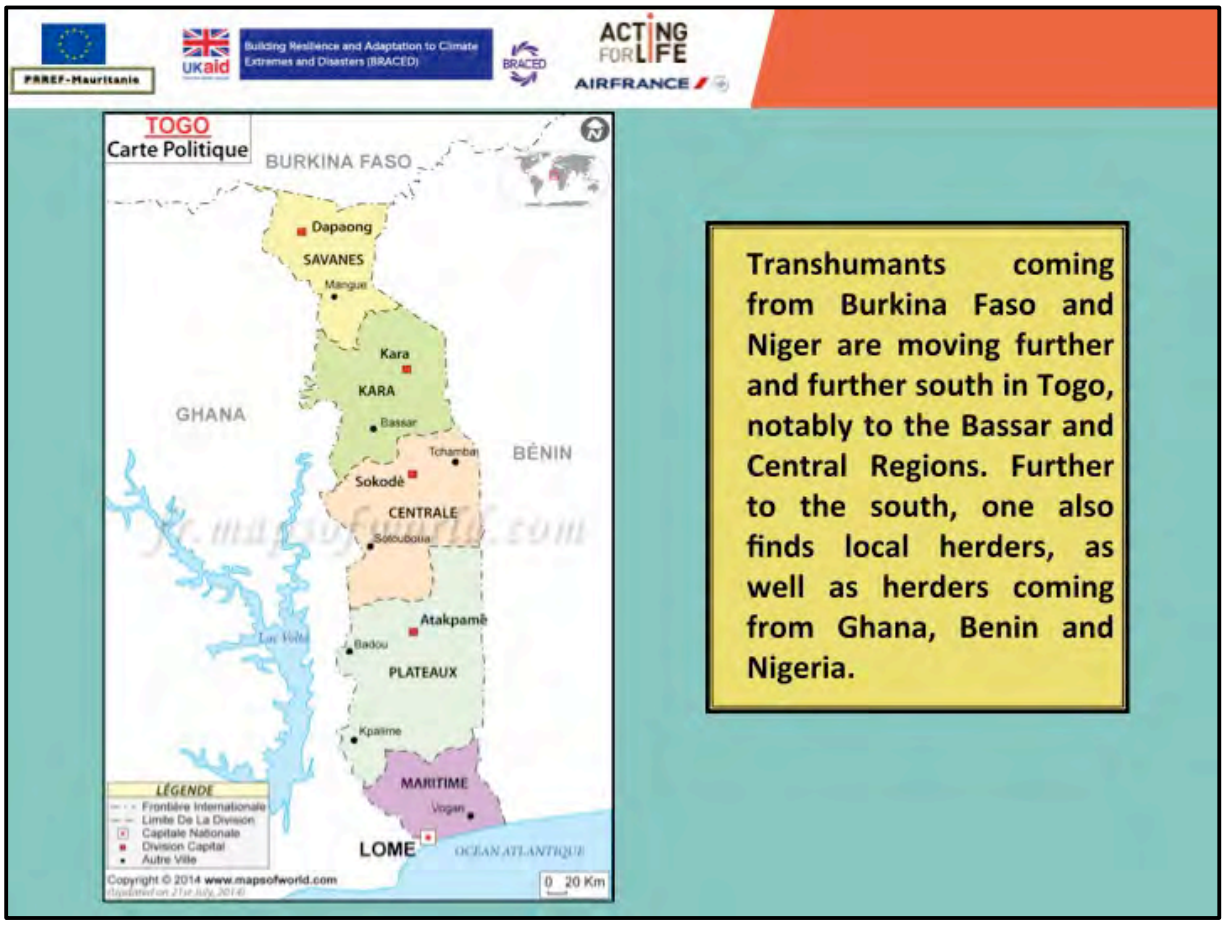
FINDING 3: Transhumance can extend over long periods of time, often crosses borders, with multiple hosting areas both on the way out, and on the way back

OUT OF 386 FAMILIES:
50% in-country transhumance, 50% cross-border

AVERAGE DURATION: between 5 and 7 and a half months, staying at/passing through between 4 and 15 hosting areas

A TENDENCY TO MOVE FURTHER AND FURTHER SOUTH

Introduction to debate 4: slide 9



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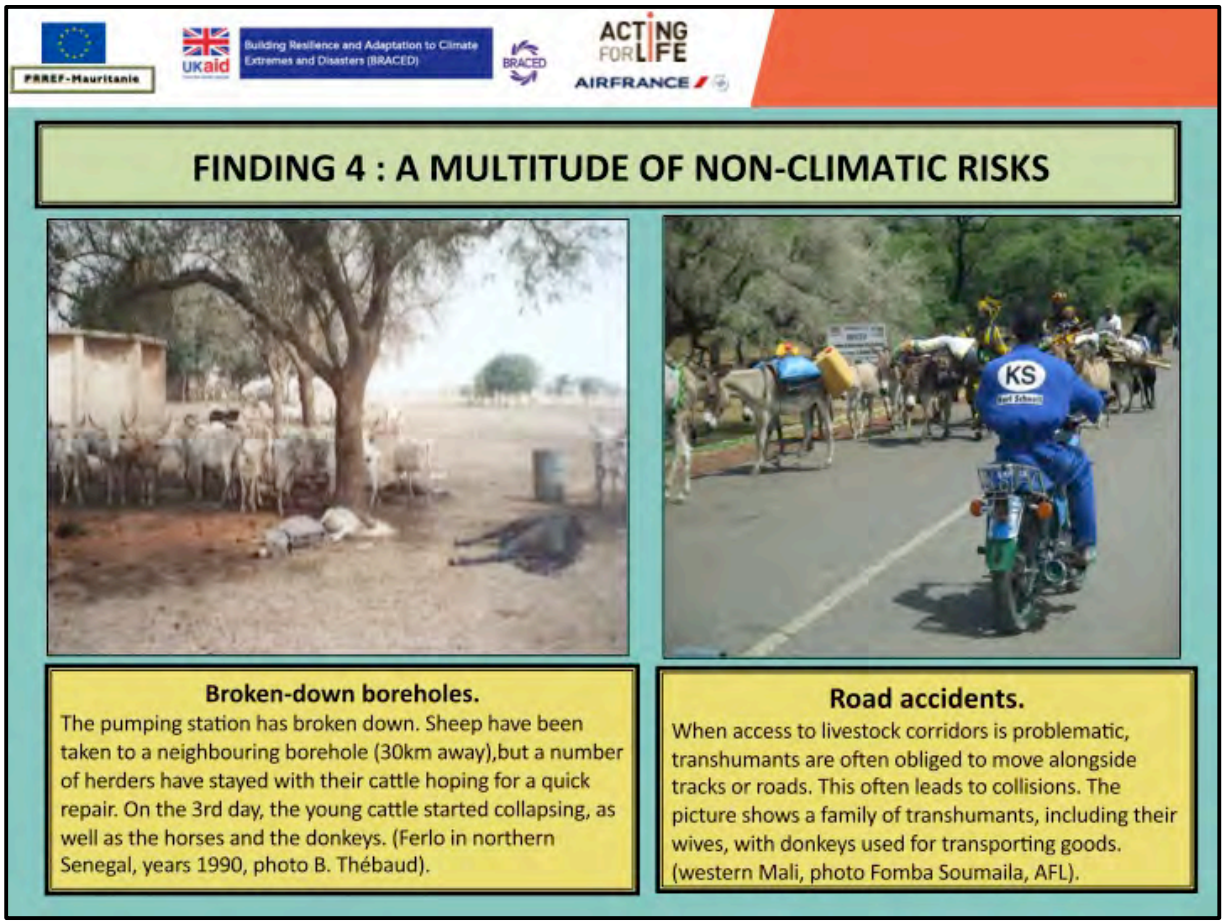
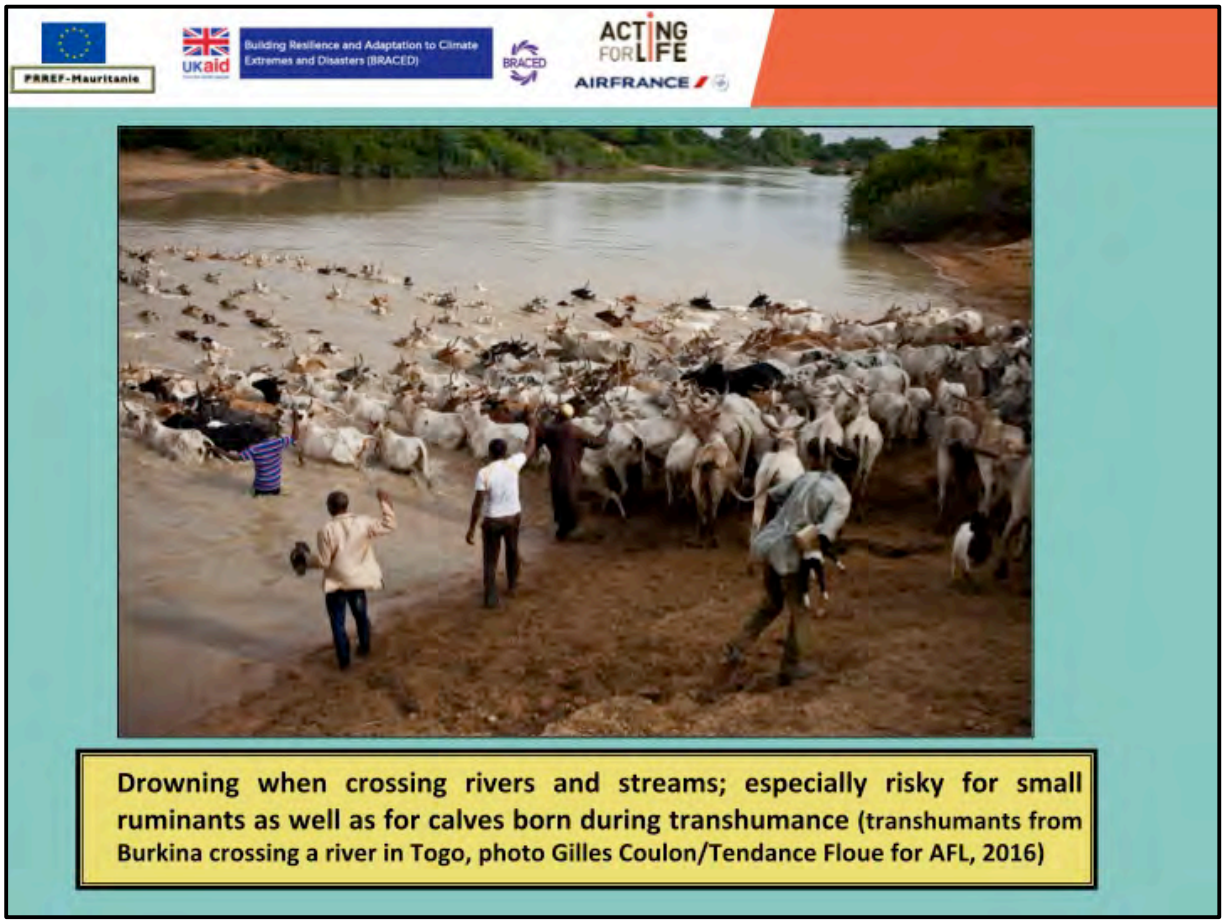


Introduction to debate 4: slide 11



Introduction to debate 4: slide 12

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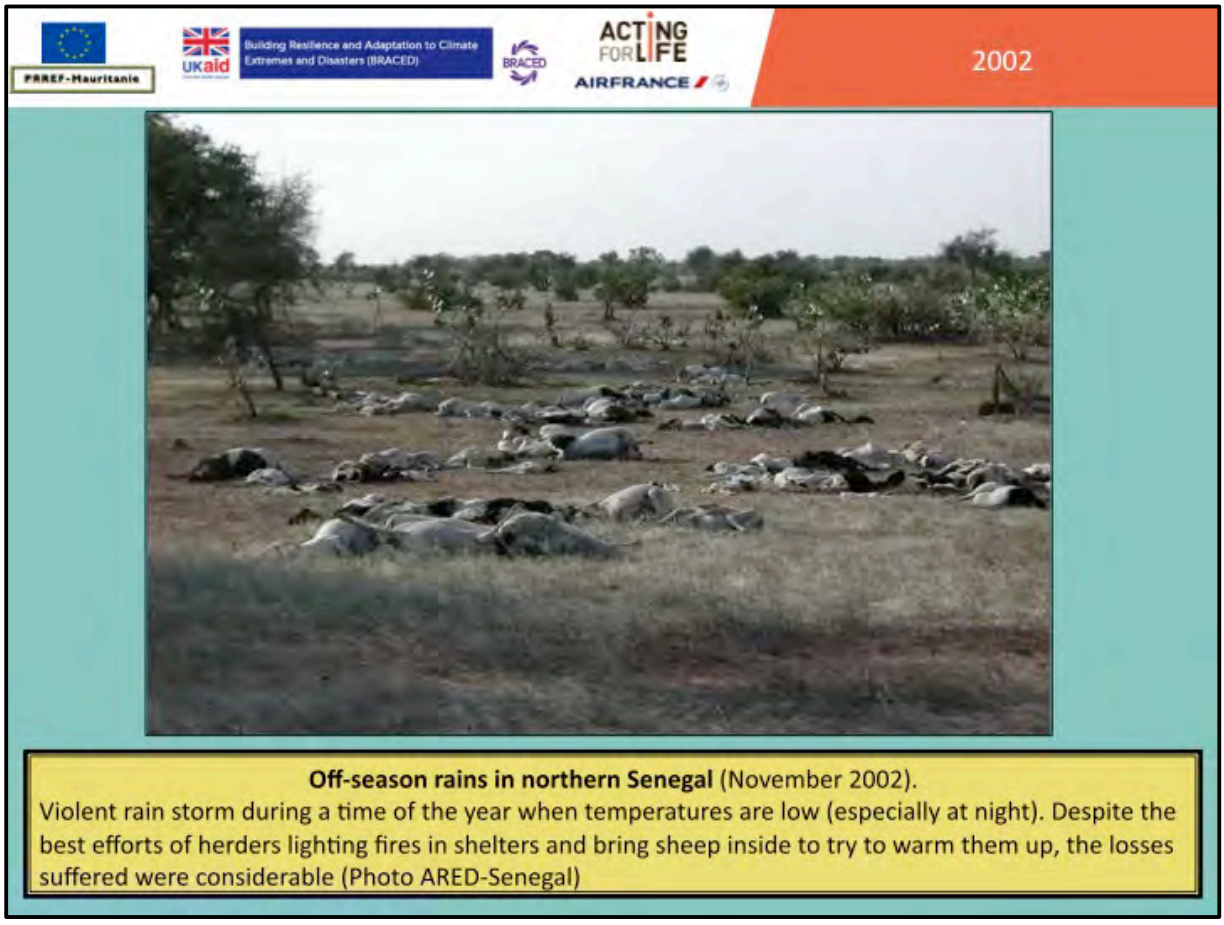

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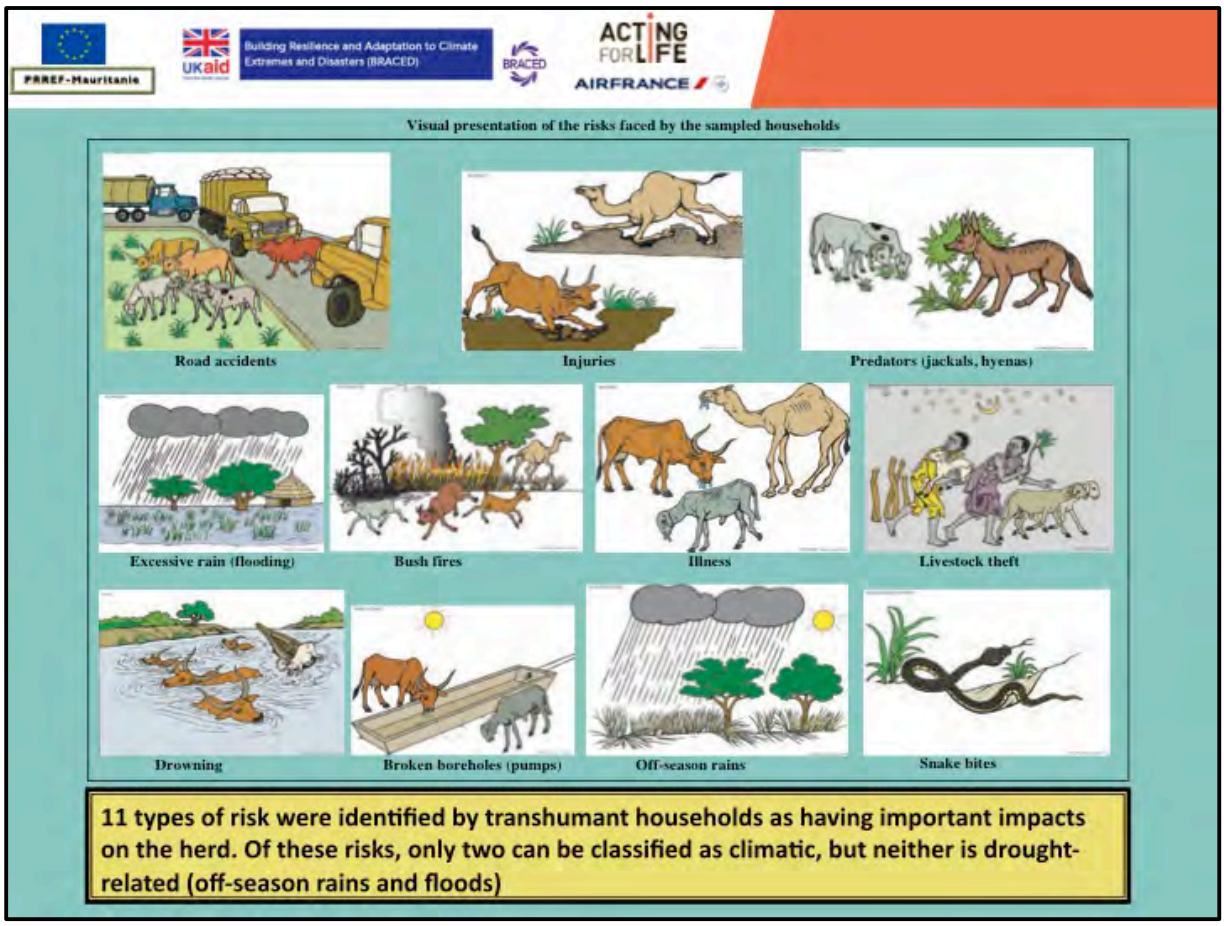

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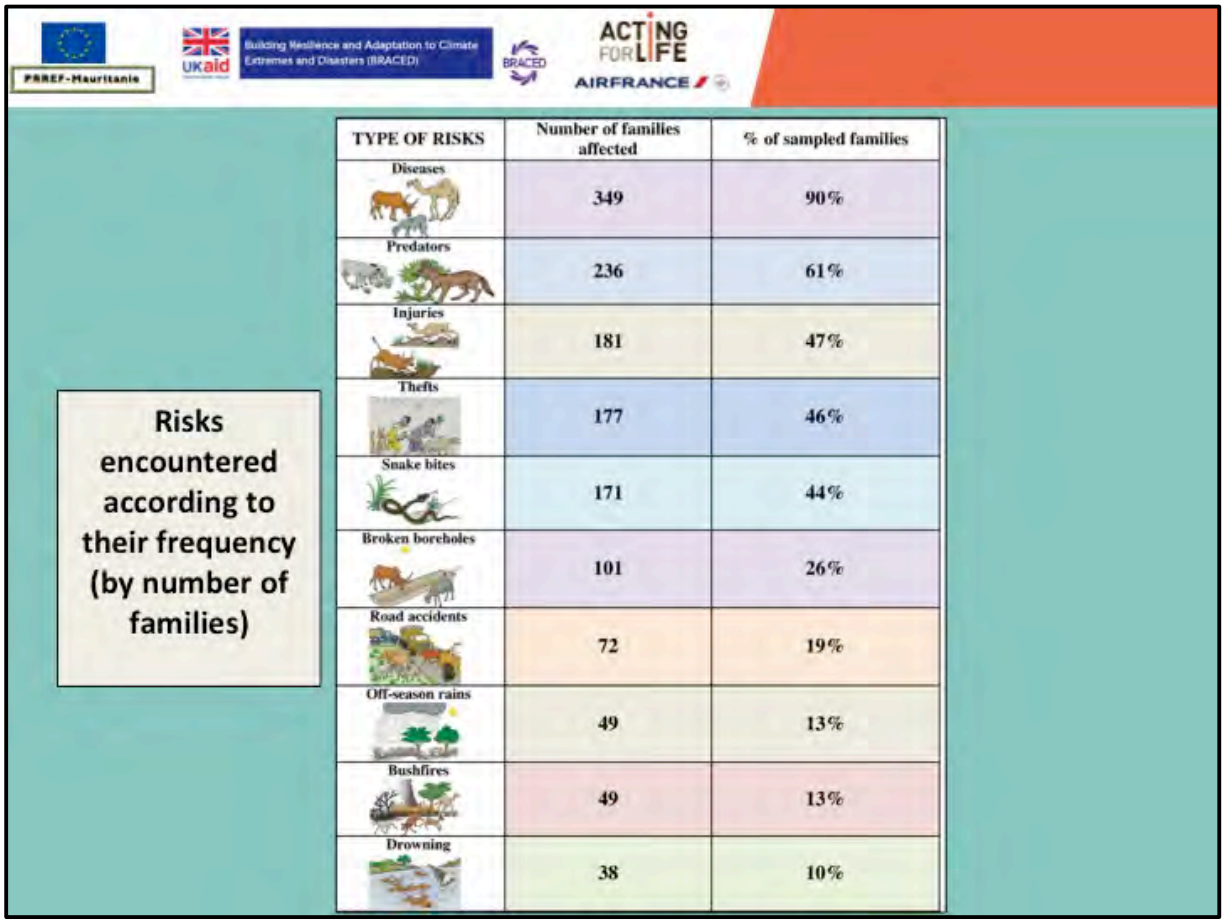

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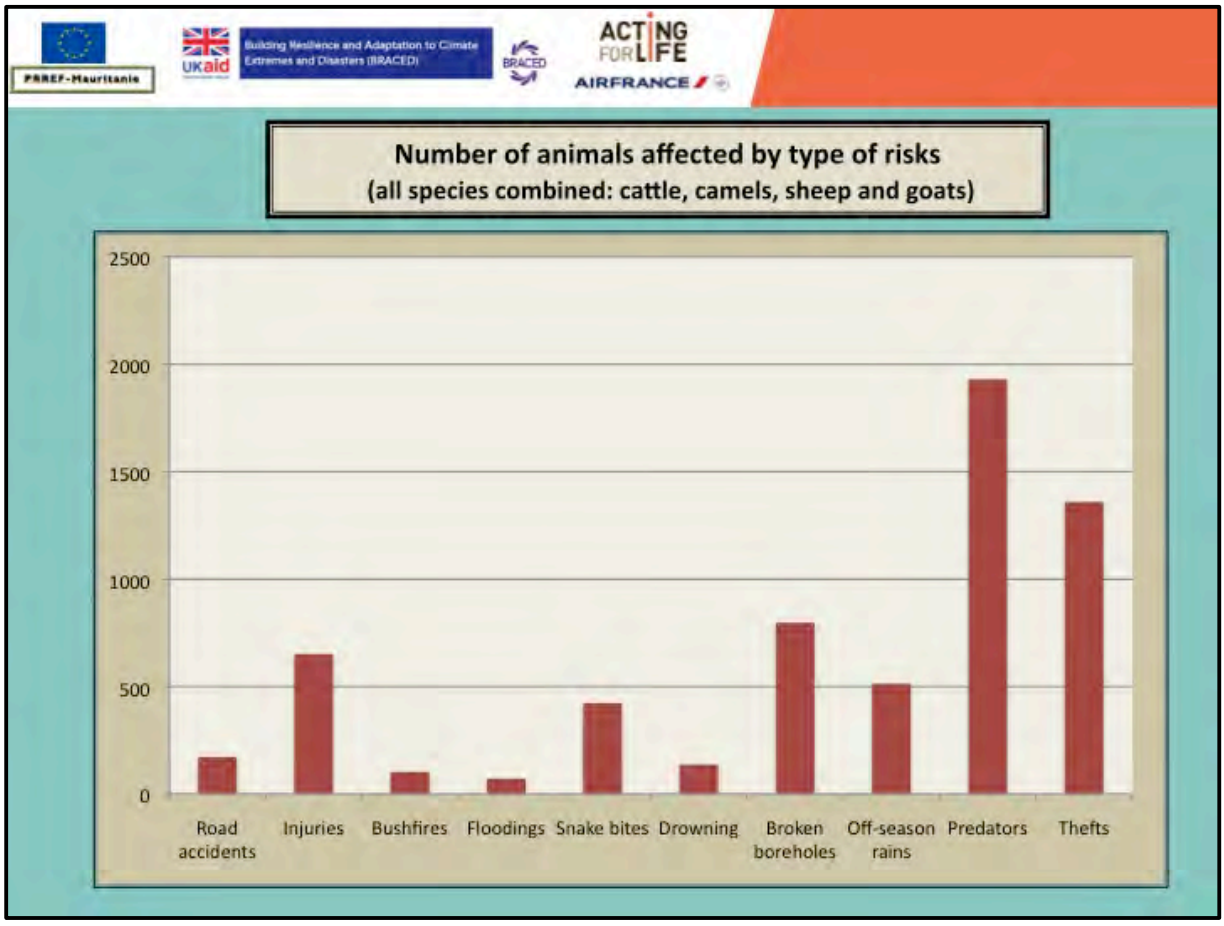

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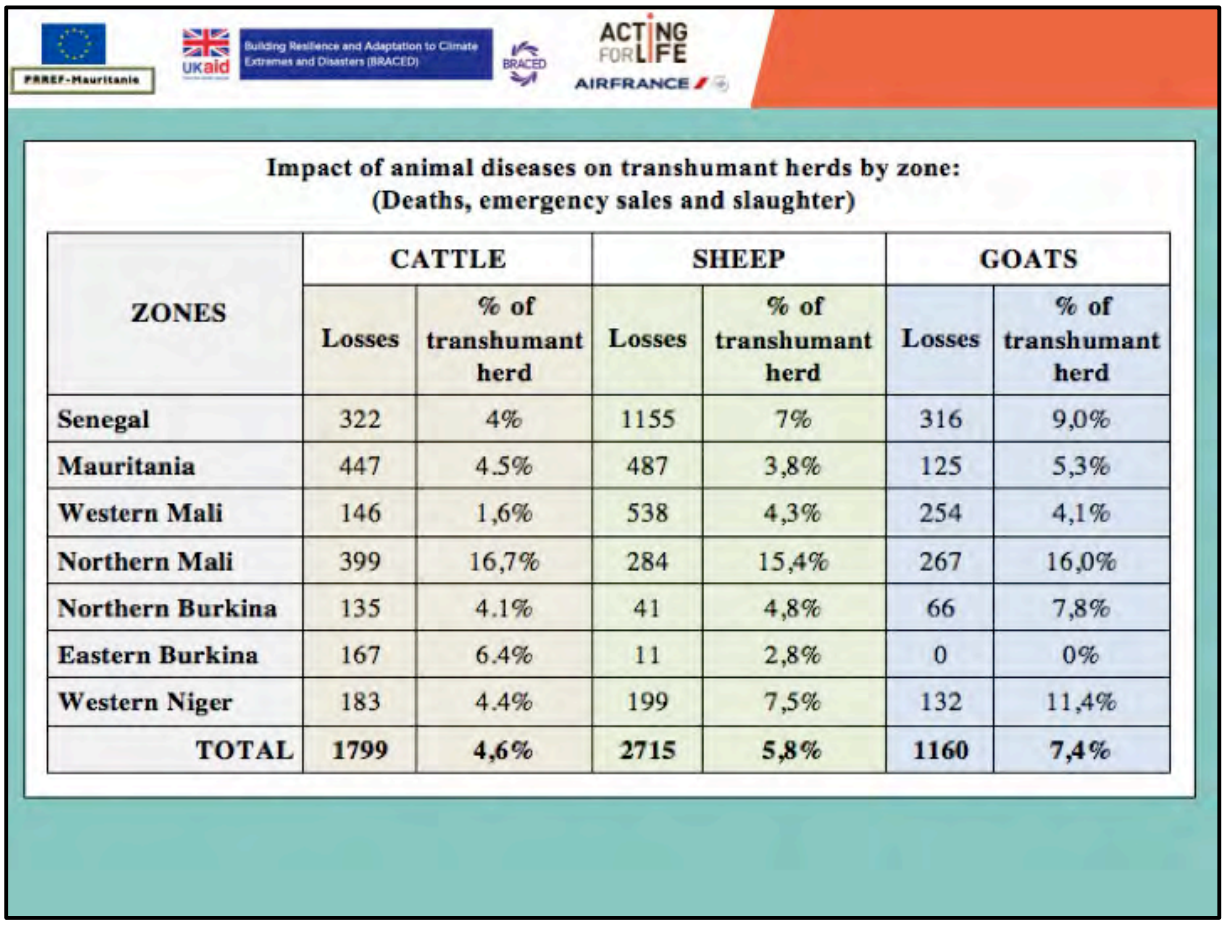
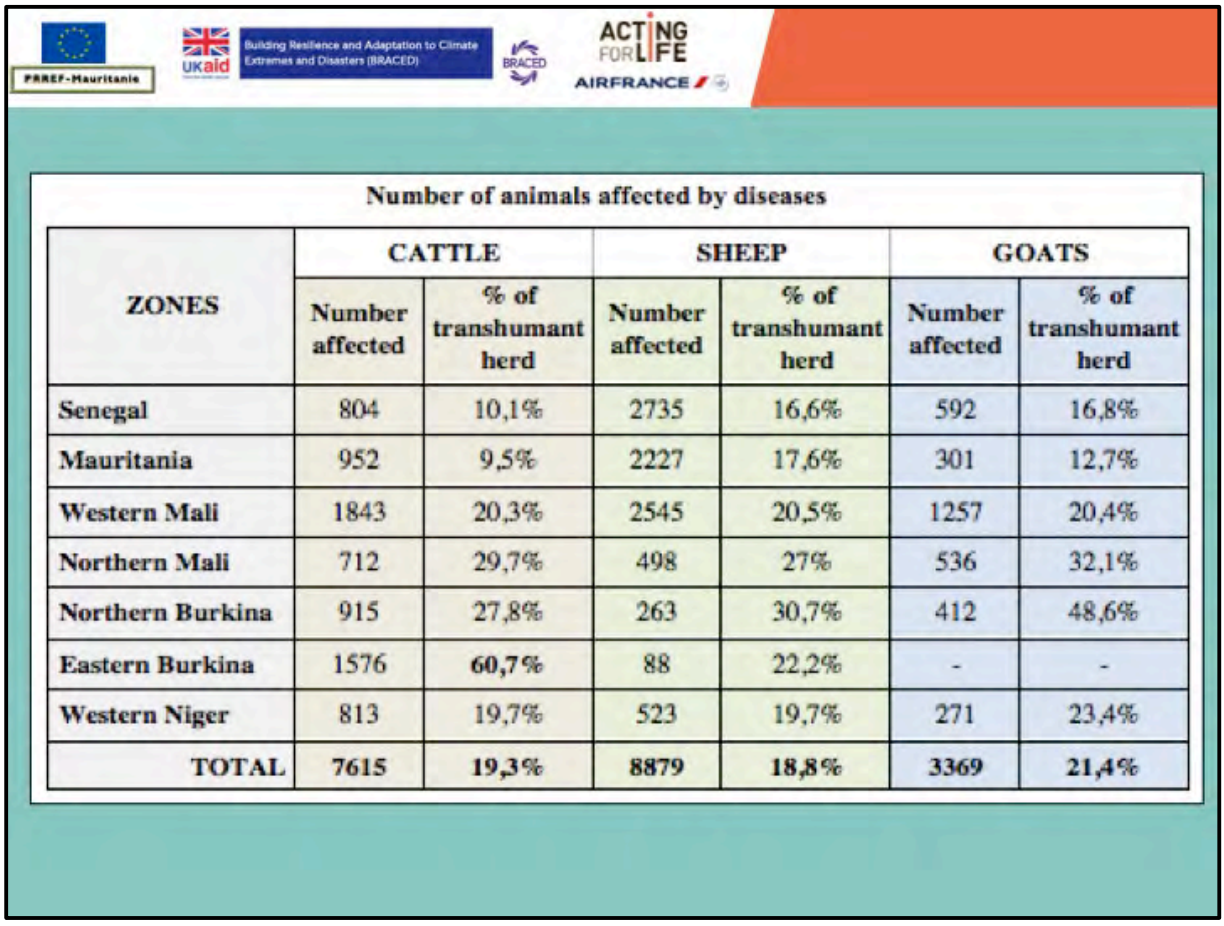


Impact of animal diseases on transhumant herds by zone:
(Deaths, emergency sales and slaughter)

ZONES	CATTLE		SHEEP		GOATS	
	Losses	% of transhumant herd	Losses	% of transhumant herd	Losses	% of transhumant herd
Senegal	322	4%	1155	7%	316	9,0%
Mauritania	447	4.5%	487	3,8%	125	5,3%
Western Mali	146	1,6%	538	4,3%	254	4,1%
Northern Mali	399	16,7%	284	15,4%	267	16,0%
Northern Burkina	135	4.1%	41	4,8%	66	7,8%
Eastern Burkina	167	6.4%	11	2,8%	0	0%
Western Niger	183	4.4%	199	7,5%	132	11,4%
TOTAL	**1799**	**4,6%**	**2715**	**5,8%**	**1160**	**7,4%**

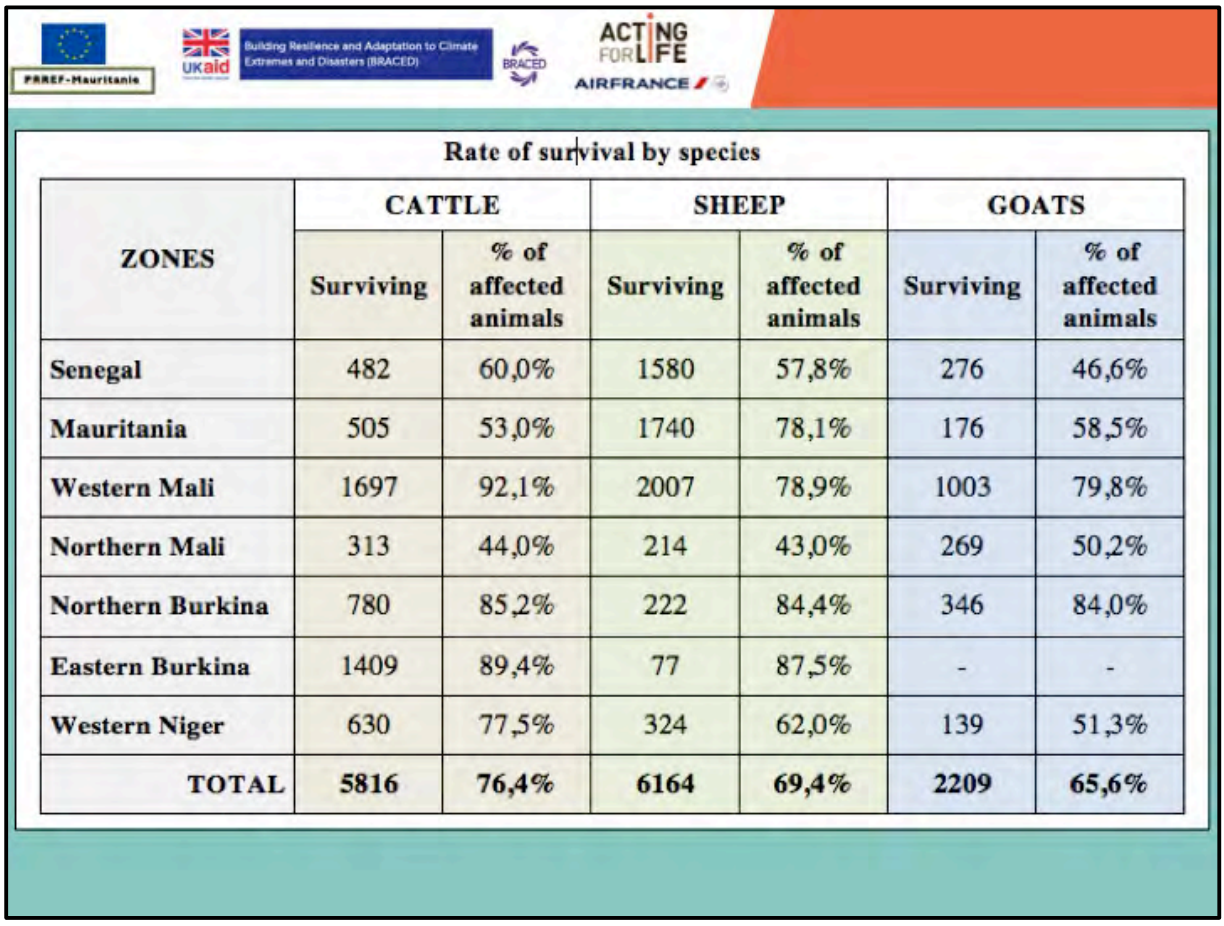
Introduction to debate 4: slide 18



Number of animals affected by diseases

ZONES	CATTLE		SHEEP		GOATS	
	Number affected	% of transhumant herd	Number affected	% of transhumant herd	Number affected	% of transhumant herd
Senegal	804	10,1%	2735	16,6%	592	16,8%
Mauritania	952	9,5%	2227	17,6%	301	12,7%
Western Mali	1843	20,3%	2545	20,5%	1257	20,4%
Northern Mali	712	29,7%	498	27%	536	32,1%
Northern Burkina	915	27,8%	263	30,7%	412	48,6%
Eastern Burkina	1576	**60,7%**	88	22,2%	-	-
Western Niger	813	19,7%	523	19,7%	271	23,4%
TOTAL	**7615**	**19,3%**	**8879**	**18,8%**	**3369**	**21,4%**

Introduction to debate 4: slide 19



Rate of survival by species

ZONES	CATTLE		SHEEP		GOATS	
	Surviving	% of affected animals	Surviving	% of affected animals	Surviving	% of affected animals
Senegal	482	60,0%	1580	57,8%	276	46,6%
Mauritania	505	53,0%	1740	78,1%	176	58,5%
Western Mali	1697	92,1%	2007	78,9%	1003	79,8%
Northern Mali	313	44,0%	214	43,0%	269	50,2%
Northern Burkina	780	85,2%	222	84,4%	346	84,0%
Eastern Burkina	1409	89,4%	77	87,5%	-	-
Western Niger	630	77,5%	324	62,0%	139	51,3%
TOTAL	**5816**	**76,4%**	**6164**	**69,4%**	**2209**	**65,6%**

Introduction to debate 4: slide 20

The downward effect of diseases on livestock prices (emergency sales)

Amadou Ly (44 years)
Municipality of Tekane, Trarza Region (Mauritanie)

Small household (4 adults with 3 children under 12). Amadou is also a livestock trader, but do not grow staple foods.

Amadou, with his mother in law and his son, left at the end of February 2015 with the family herd, to access refuge areas in south-eastern Senegal. They arrive in the Kompentoum area at the beginning of May, with 160 cattle, 1 camel, 50 sheep and 8 goats.

In order to cover for the cost of livestock feed (cotton seeds), he has sold a bull, just before leaving his home base, in Tekane.

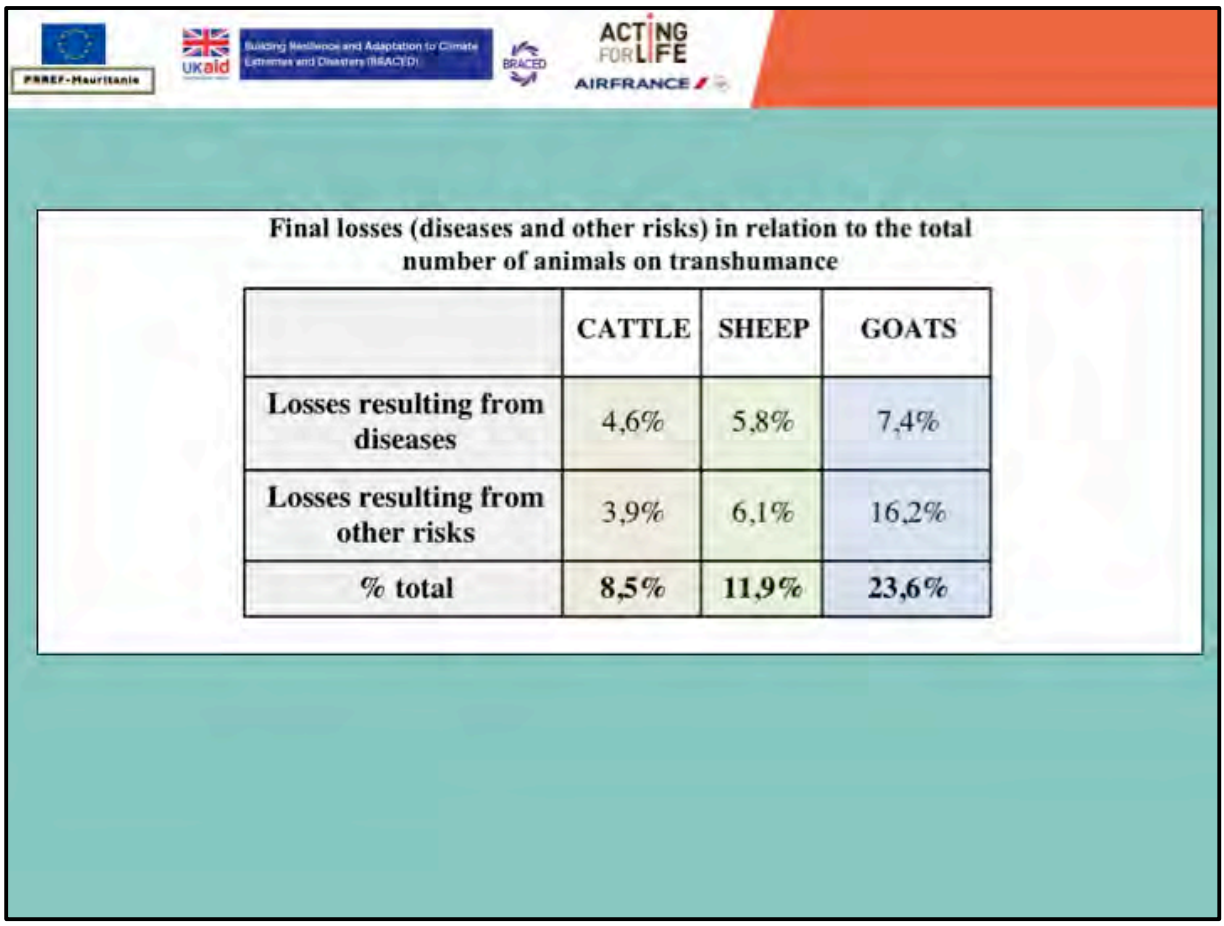
During the transhumance journey, diseases affect a significant number of his cattle: diarrhoea and, most of all, foot and mouth disease. In March, he is forced to sell a Young bull (3 years old) for only 20,000 CFA. One month later, he brings to the local markets 5 additional animals (3 reproductive cows and 2 adult bulls), which are sold for only 30,000 FCFA each.

Introduction to debate 4: slide 21

OVERVIEW OF TOTAL LOSSES PER RISK AND SPECIES

TYPES OF RISKS	Cattle	Camels	Sheep	Goats
Diseases	1799	60	2715	1160
Injuries	421	5	224	57
Thefts	375	59	594	497
Broken boreholes	249	0	337	349
Off-season rains	155	0	196	267
Predators	107	1	1109	1082
Snake bites	81	2	235	128
Drowning	70	0	29	57
Road accidents	52	3	82	51
Bushfires	18	0	62	43
Flooding	15	0	38	21
Total	3342	130	5621	3712
% of losses resulting from diseases	4,6%	5,9%	5,7%	7,4%
Total % of losses (all risks included)	8,5%	12,7%	11,9%	23,6%

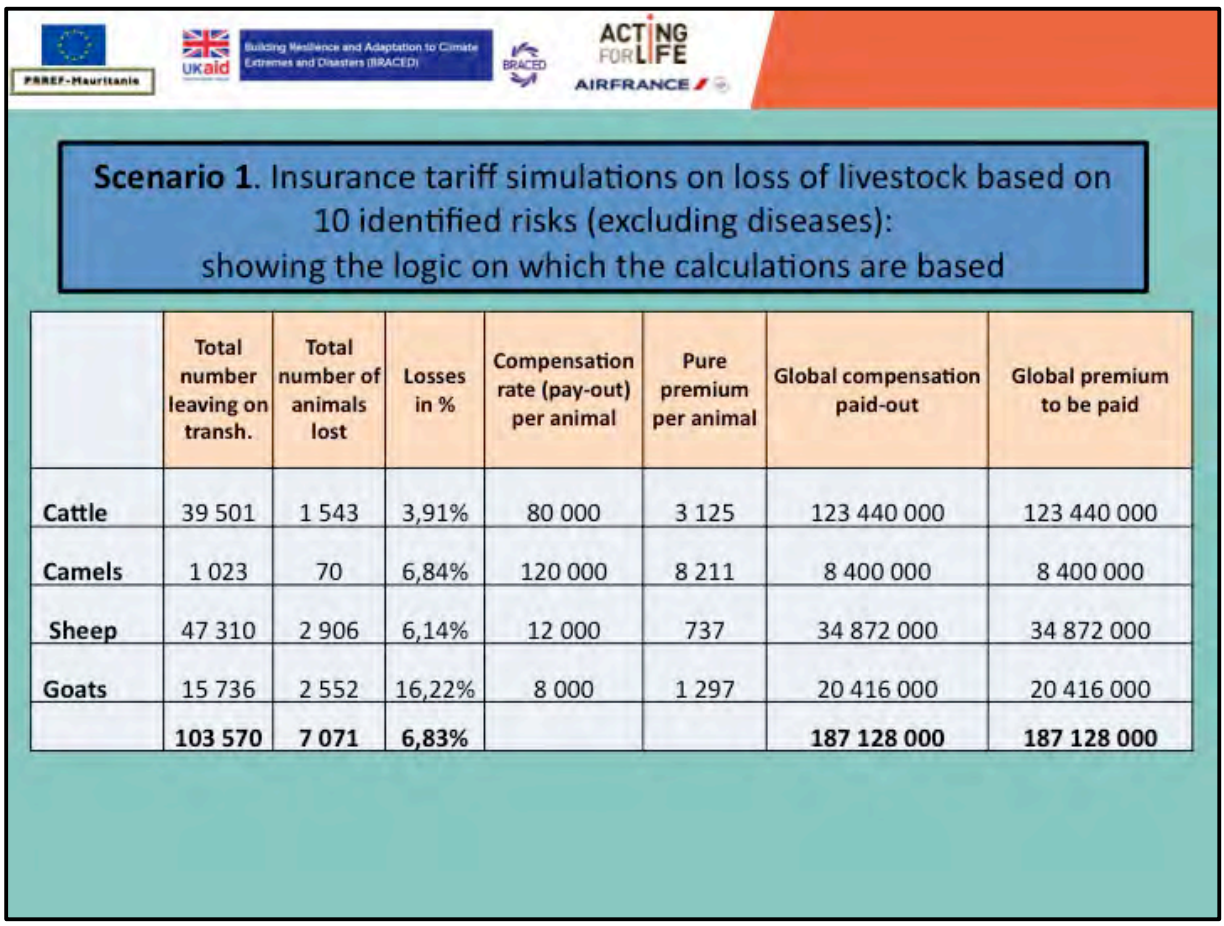
Introduction to debate 4: slide 22



Final losses (diseases and other risks) in relation to the total number of animals on transhumance

	CATTLE	SHEEP	GOATS
Losses resulting from diseases	4,6%	5,8%	7,4%
Losses resulting from other risks	3,9%	6,1%	16,2%
% total	**8,5%**	**11,9%**	**23,6%**

Introduction to debate 4: slide 23



Scenario 1. Insurance tariff simulations on loss of livestock based on 10 identified risks (excluding diseases): showing the logic on which the calculations are based

	Total number leaving on transh.	Total number of animals lost	Losses in %	Compensation rate (pay-out) per animal	Pure premium per animal	Global compensation paid-out	Global premium to be paid
Cattle	39 501	1 543	3,91%	80 000	3 125	123 440 000	123 440 000
Camels	1 023	70	6,84%	120 000	8 211	8 400 000	8 400 000
Sheep	47 310	2 906	6,14%	12 000	737	34 872 000	34 872 000
Goats	15 736	2 552	16,22%	8 000	1 297	20 416 000	20 416 000
	103 570	**7 071**	**6,83%**			**187 128 000**	**187 128 000**

Introduction to debate 4: slide 24

Scenario 2. Insurance rates covering illness and other risks (but excluding livestock theft)

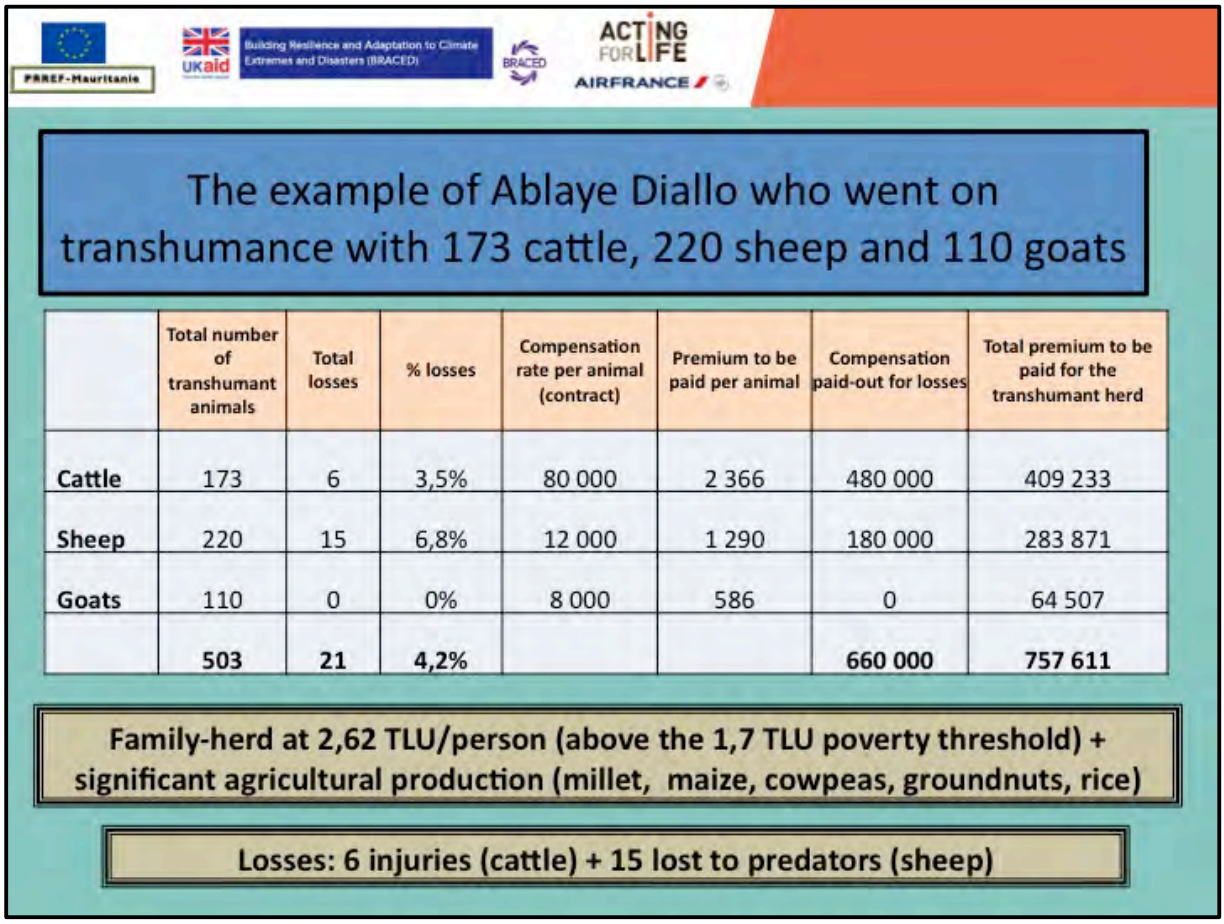
	9 risks				Diseases			
	Losses in %	Pure premium per animal	Average number of animals per family	Average premium per family	Losses in %	Pure premium per animal	Average number of animals per family	Average premium per family
Cattle	2,96%	2 366	102	242 073	4,55%	3 643	102	372 850
Camels	1,08%	1 290	3	3 420	5,87%	7 038	3	18 653
Sheep	4,89%	586	123	71 876	5,74%	689	123	84 404
Goats	13,06%	1 045	41	42 591	7,37%	590	41	24 041
		5 287	**268**	**359 959**		**11 960**	**268**	**499 948**

Introduction to debate 4: slide 25

Scenario 3. Insurance rates on livestock theft and rates covering all risks 11 identified risks combined

	Thefts				TOTAL (9 risks + thefts + diseases)			
	Losses in %	Pure premium per animal	Average number of animals per family	Average premium per family	Losses in %	Pure premium per animal	Average number of animals per family	Average premium per family
Cattle	0,95%	759	102	77 720	8,46%	6 768	102	692 642
Camels	5,77%	6 921	3	18 342	12,71%	15 249	3	40 415
Sheep	1,26%	151	123	18 466	11,88%	1 426	123	174 746
Goats	3,16%	253	41	10 301	23,59%	1 887	41	76 933
		8 084	**268**	**124 829**		**25 331**	**268**	**984 736**

Introduction to debate 4: slide 26



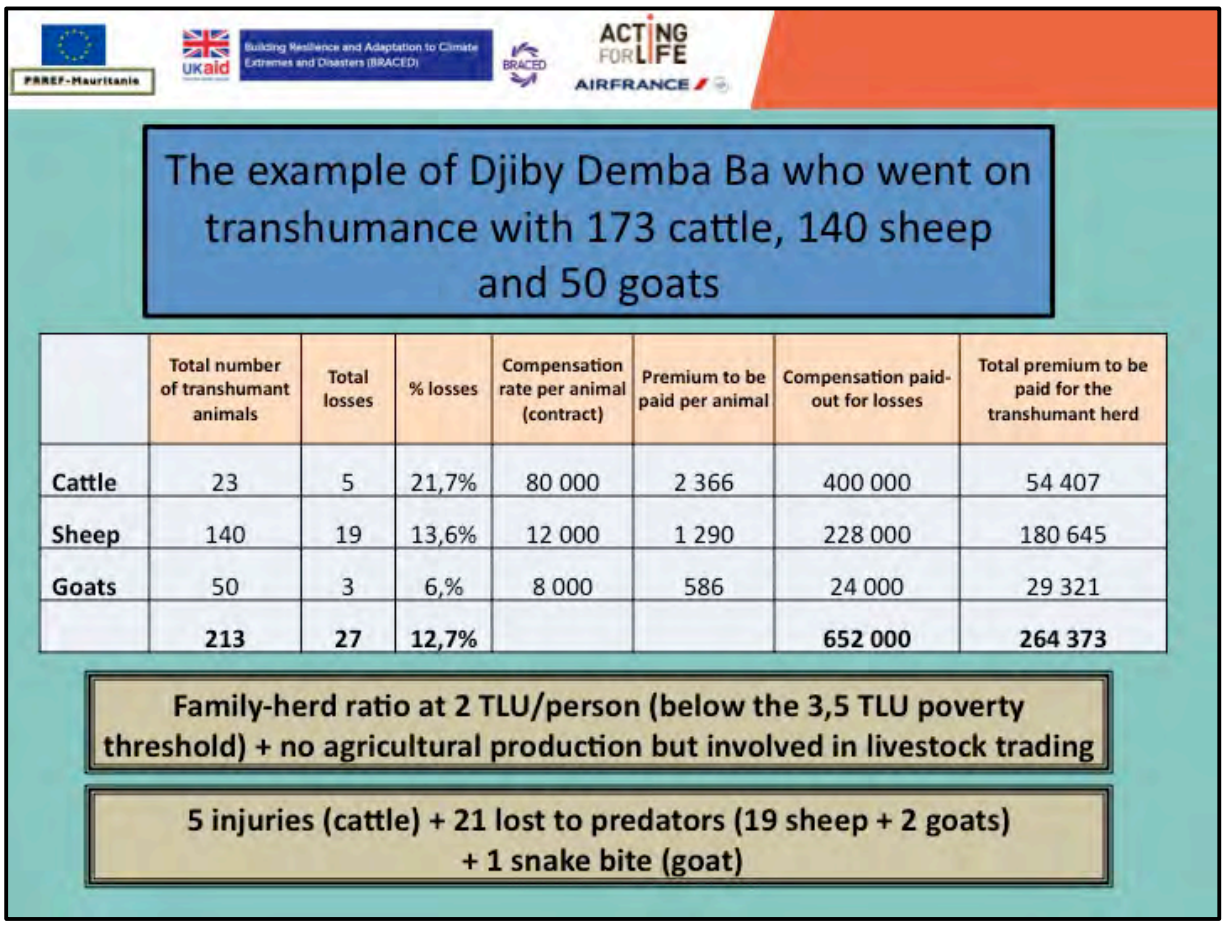
The example of Ablaye Diallo who went on transhumance with 173 cattle, 220 sheep and 110 goats

	Total number of transhumant animals	Total losses	% losses	Compensation rate per animal (contract)	Premium to be paid per animal	Compensation paid-out for losses	Total premium to be paid for the transhumant herd
Cattle	173	6	3,5%	80 000	2 366	480 000	409 233
Sheep	220	15	6,8%	12 000	1 290	180 000	283 871
Goats	110	0	0%	8 000	586	0	64 507
	503	**21**	**4,2%**			**660 000**	**757 611**

Family-herd at 2,62 TLU/person (above the 1,7 TLU poverty threshold) + significant agricultural production (millet, maize, cowpeas, groundnuts, rice)

Losses: 6 injuries (cattle) + 15 lost to predators (sheep)

Introduction to debate 4: slide 27



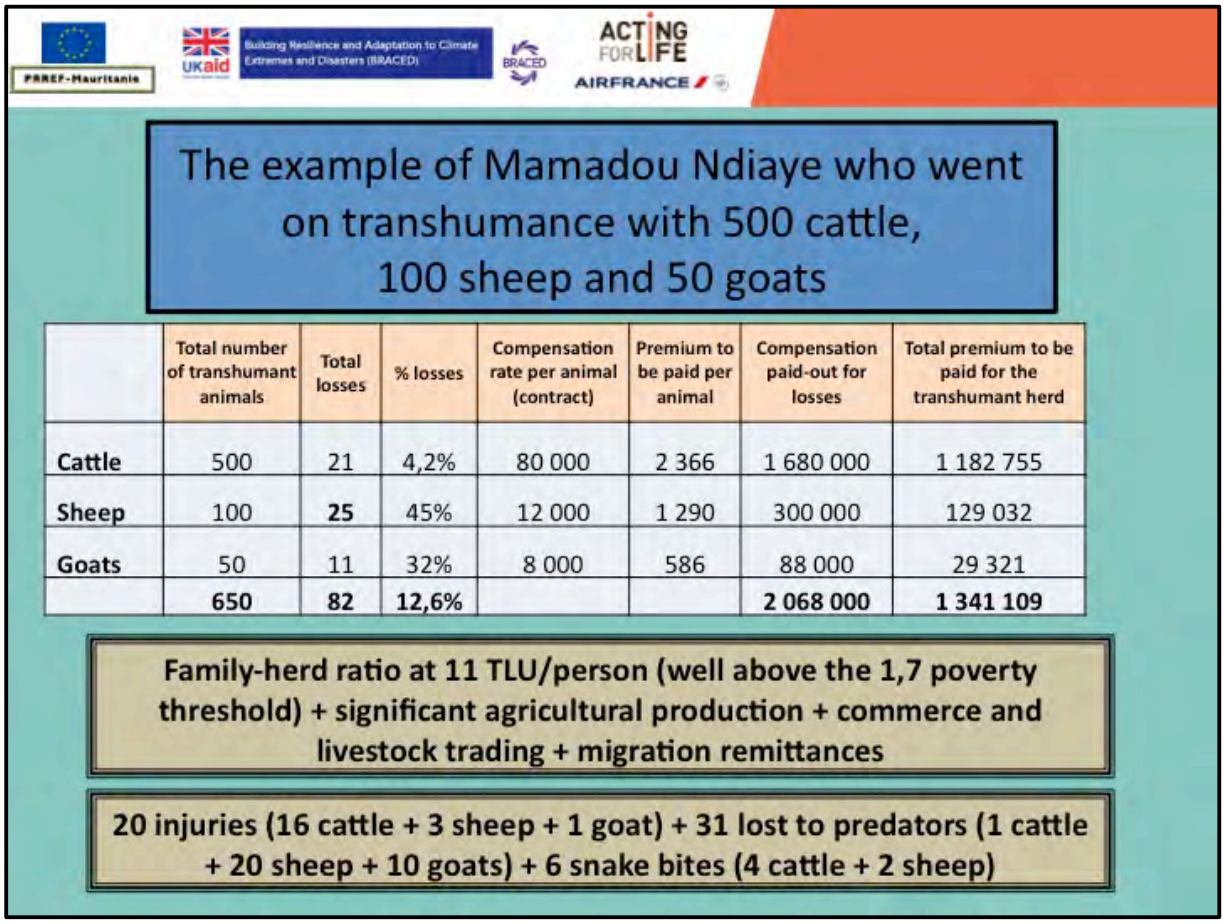
The example of Djiby Demba Ba who went on transhumance with 173 cattle, 140 sheep and 50 goats

	Total number of transhumant animals	Total losses	% losses	Compensation rate per animal (contract)	Premium to be paid per animal	Compensation paid-out for losses	Total premium to be paid for the transhumant herd
Cattle	23	5	21,7%	80 000	2 366	400 000	54 407
Sheep	140	19	13,6%	12 000	1 290	228 000	180 645
Goats	50	3	6,%	8 000	586	24 000	29 321
	213	**27**	**12,7%**			**652 000**	**264 373**

Family-herd ratio at 2 TLU/person (below the 3,5 TLU poverty threshold) + no agricultural production but involved in livestock trading

5 injuries (cattle) + 21 lost to predators (19 sheep + 2 goats) + 1 snake bite (goat)

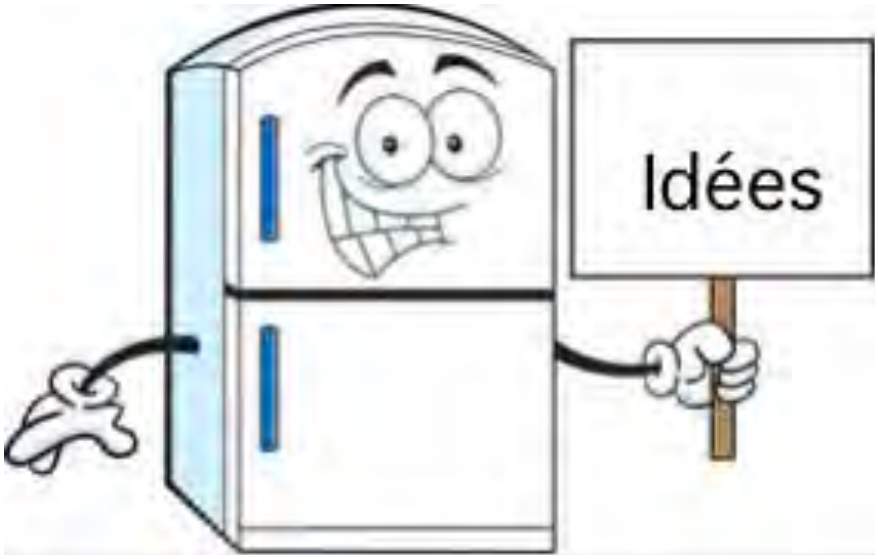
Introduction to debate 4: slide 28



	Total number of transhumant animals	Total losses	% losses	Compensation rate per animal (contract)	Premium to be paid per animal	Compensation paid-out for losses	Total premium to be paid for the transhumant herd
Cattle	500	21	4,2%	80 000	2 366	1 680 000	1 182 755
Sheep	100	**25**	45%	12 000	1 290	300 000	129 032
Goats	50	11	32%	8 000	586	88 000	29 321
	650	**82**	**12,6%**			**2 068 000**	**1 341 109**

Introduction to debate 4: slide 29

ANNEX 7. The “fridge” of ideas



The "fridge" of ideas

? Would it be better to design insurance products for producers or rather insure governments to cover climate disasters?

? Is it profitable for a herder to pay a premium year after year to be insured against a risk that may only occur exceptionally (such as wide-scale regional or national drought)?

? Which risks truly deserve to be insured: for production, for human health (herders), for drought, for other types of climate risks besides drought (e.g., out-of-season rainfall) or for non-climate related risks (e.g., livestock theft)?

! Absolute necessity to take into account the issue raised at a sub-regional level (ECOWAS) due to the importance of the industry, the increasingly cross-border dimension of mobility and the impact of droughts in the context of climate changes

! We must find insurance products that are based on an overall approach of three pillars of livestock production systems: resources (water and pasture), family and the herd.

? Is it better to conceive or insurance products per country or at the sub-regional scale?

! The fact that mobility is increasingly cross-border may pose problems with developing insurance products (portability of the risk)

! Membership by herders in this type of insurance is important to obtain

! There is a relationship between human and animal disease and drought; we should not dissociate the herd and the herder when insuring them

! It is not necessarily the owner of the animals who does the transhumance and this may have consequences in assessing risks from the insurer's point of view

! The question of knowing if it is better to have index-based insurance related to the climate (drought) or fully comprehensive insurance (e.g., against livestock theft) is truly fundamental

! We know that there is a lack of statistics in the Sahel in order to construct a satisfactory climate index pertaining to livestock losses

! The insurance rate (premium to be paid by the member) should be adapted depending on the species and type of animals (e.g., breeding-age females versus adult males)

! The question of accessibility of the insurance product is fundamental

! Compensation rates in the event of incidents must be adapted to the needs of herders

! Necessity to include microinsurance for livestock in an overall strategy to manage risks in livestock production and to articulate various levels (involvement of the government, social networks, insurance, reinsurance, etc.)

? Can livestock insurance also include a dimension of civil liability (e.g., in the event of conflicts between livestock herders and agricultural farmers)?

! It is important to remember that we cannot have insurance without having access to statistics

! Professional organisations (such as herders associations) have a role to play in creating insurance products

! Insuring livestock means protecting the entire livestock sector, i.e., the production as well as the meat and dairy value chains. Thus, this is a vital economic challenge, hence the importance of the government and sub-regional institutions in this domain.

? What may be the impact of livestock insurance on mobility, and therefore, on the strategies of drought management?

? As far as the livestock industry and transportation by truck of livestock toward the markets, the entire issue of livestock insurance needs to be clarified: who pays (herder, operator, transporter)? are the animals truly insured? how should we take into consideration transportation conditions (trucks often in poor condition, used for the transportation of other merchandise, etc.)?

! Preventative work with regard to crises remains fundamental: insurance cannot solve everything

! We must also improve access to services and hosting conditions of transhumant herders in reception areas. This is just as important.

? Who should pay for insurance? There are many stakeholders who intervene at various times with a herd

! If types of insurance exist relating to insurance models developed for herders, it is important to take inspiration from them to find a product suitable for herders

? What are the conditions of access required for animal health in order to meet the insurance conditions?

! The question of the means needed to collect statistical data before insurance products are issued is essential.

! For index-based insurance, the basis risk is still important because of frequent cases of pockets of drought

? We must ask the question of knowing which animals should be insured in mobile systems: those who remain behind in the home base or those who leave on transhumance

? The cost of insurance may turn out to be too high for vulnerable herders. What solution could we provide for them and what is the role of the government in this?

! It is complicated to build an accurate climate index when it comes to herders who leave on long transhumance journeys

? What types of indexes could be developed (ARC example)?

? How do we develop an effective product for vulnerable herders?

! We need to change our approach

! Herders must be more informed about existing situations (e.g., climate-based) and changes that intervene

! The role of the government is essential in index-based insurance

! Herders must be involved in monitoring the assessment of biomass and we must capitalize on their expertise

! The role of the government and the sub-regional level is unavoidable because this involves the protection of herders and of national livestock numbers. These are high economic stakes that also effect the establishment of sustainable social peace

! Functional articulation is needed between Producer Organisations, herders and insurers

! Indexes should be able to evolve in order to consider the fact that it is not only drought that should be monitored and measured. For example, in some situations, there may be excessive rainfall and flooding

! There are not only climate risks to consider, but also health risks due to livestock diseases

! The issue of the value of an animal at the time of an incident compared to the reference value in the insurance contract is important to be clarified

? Can we take into consideration other risks besides climate risks in livestock insurance? This is the question of the notion of insurable risks

! Among other risks that need to be examined, is that of animals being impounded or confiscated.

! Access to animal health services remains critical. Without this access, the risk will increase and will become non-insurable (because too costly)

ANNEX 8. BILIOGRAPHY

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