

Introduction

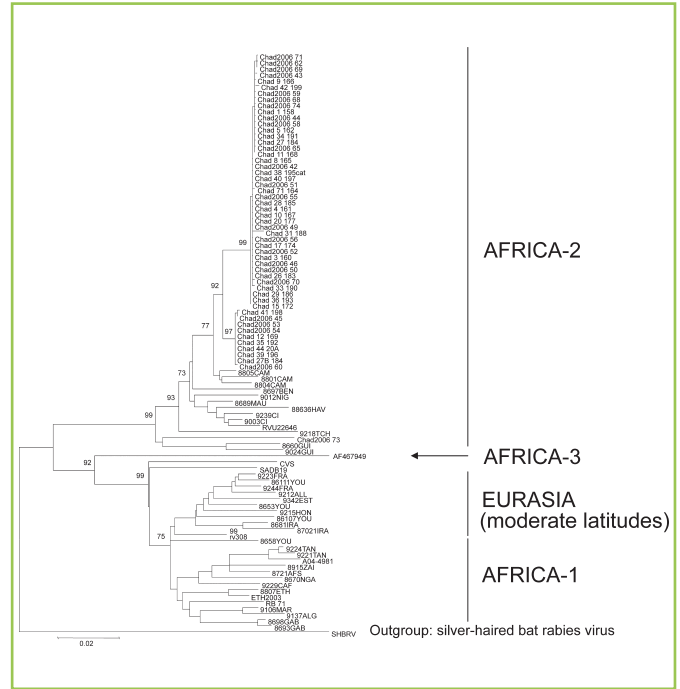
Human and Animal Health is a newly created research unit. One of its main activities is the involvement in the National Centre of Competence in Research North-South (NCCR N-S). Owing to internal cross-collaborations, other efforts relating to NCCR N-S are reported in sections 8 and 10.

11.1 NCCR N-S

Together with the Department of Water and Sanitation in Developing Countries (Sandec) of the Swiss Federal Institute for Environmental Science and Technology (EAWAG), we are closely collaborating as Work Package 3 (WP3) <http://www.north-south.unibe.ch/content.php/page/id/168>. In Africa, Asia and Latin America, we study determinants of vulnerability and resilience in urban settings, pastoral zones and rural-urban interfaces, as well as key equity-effective interventions for health, environmental sanitation and social systems.

Vulnerability and resilience in urban and pastoral contexts

The health and well-being of populations is not determined only by risk of disease but by a complex tissue of interacting individual, social, cultural, political, economic and environmental factors. These interactions affect exposure to risk as well as vulnerability and behaviours for coping and choosing strategies for resisting threats. Such strategies are also called patterns of resilience. They are dealt with conceptually in the so-called Transversal Project (see section 10). Case studies addressed the interface of agriculture and human health in two different urban settings of Côte d'Ivoire. Complementary to this study, malaria risk resulting from urban agriculture was explored in an operational malaria control setting in Dar es Salaam (Tanzania), resulting in a simple, community-based and participatory mapping procedure to enable malaria control by routine larviciding. A medical anthropological study aimed at better understanding



Phylogenetic relationship of dog rabies viruses isolated in N'Djaména, Chad. (Source: Dürr S et al. PLoS Negl Trop Dis. 2008 Mar 26;2(3):e206)

what malaria means for the inhabitants of the city of Abidjan and how they deal with it (see section 10). The health perspective of nomadic pastoralists is influenced both by traditional approaches and by influences of modern medicine. For example, among nomadic pastoralists in Mauritania and Chad, the biomedical concept of tuberculosis is referred to by a set of different traditional illness concepts depending on the perceived cause. Although from a modern western medical perspective these traditional views reveal numerous misconceptions, they largely determine health behaviour and help seeking. Currently in the Sahelian zone nomadic pastoralists have very limited or almost no access to the direct observed treatment short course (DOTS) strategy for TB (see below). Food safety and food security is being investigated among Chadian mobile pastoral communities in the Lake Chad area, where important levels of malnutrition among nomadic and sedentary children have been discovered.

Equity-effective interventions for reducing disease burden

We have developed a conceptual framework that combines health, ecological, social, economic and cultural assessments to improve health and environmental sanitation in urban and peri-urban areas of developing countries. The main objective is to characterise the extended health, ecological and social risks while identifying critical control points (CCPs) and complementing them by including an actor perspective that considers vulnerability to risk and patterns of resilience. Interventions deriving from the comprehensive analysis consider biomedical, engineering and social science perspectives or a combination of them. Other studies address equity effectiveness in water supply in poor urban areas of Bouaké (Côte d'Ivoire)



Electronic fingerprints for demographic surveillance among nomadic pastoralists. (Photo J. Zinsstag)

and sanitation in Ouahigouya (Burkina Faso). Furthermore, equity of access to health care for people living with HIV/AIDS is being investigated in Côte d'Ivoire. In nomadic pastoralist areas of Chad, a proof-of-principle of mobile demographic surveillance using an electronic fingerprint technology was achieved under very difficult security conditions.

### **TPP pastoral production systems**

Nomadic extensive production systems and pastoralist livelihoods are being threatened by the speed of a changing world and undergoing deep transformations. In the harsh ecological and economic environment, nomadic societies are repeatedly being forced to migrate and relocate. Their mobility, their proximity to and dependence on their livestock, a traditionally dairy-rich diet and arid habitat leave Sahelian pastoral societies exposed to a variety of health risks that are reflected in one of the highest infant mortality rates in the world. In the past 2 years assessments of various institutional changes relating to the use of natural resources have been undertaken in Central Asia and several African countries. Social interventions (legal issues, health service provision and access to markets) have been analysed to derive best practices. Based on these results, the programme contributed through multi-stakeholder workshops to enhance existing networks and capacities (new policy for nomadic communities in Chad, development of health services for Kel Tamacheq in Mali, development of a DOTS strategy adapted to mobile populations in Mauritania, establishment of an African bovine TB network). Such transdisciplinary processes promote direct dialogue between concerned populations and authorities. But equally important, they validate priorities of field research and approaches towards adapted interventions.

## **11.2 Human and animal health**

The "one health" concept, evolving from Schwabe's "one medicine" was further strengthened by contributions on detailed analysis of joint animal and human health services for nomadic pastoralists (see above) and an assessment of human benefits of interventions in

livestock. The latter was particularly geared towards zoonoses control in developing countries.

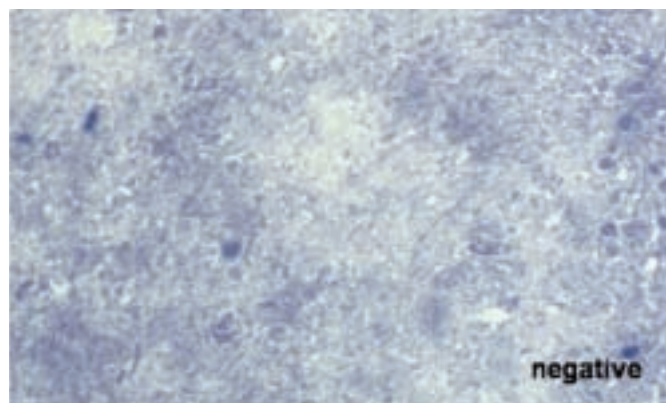
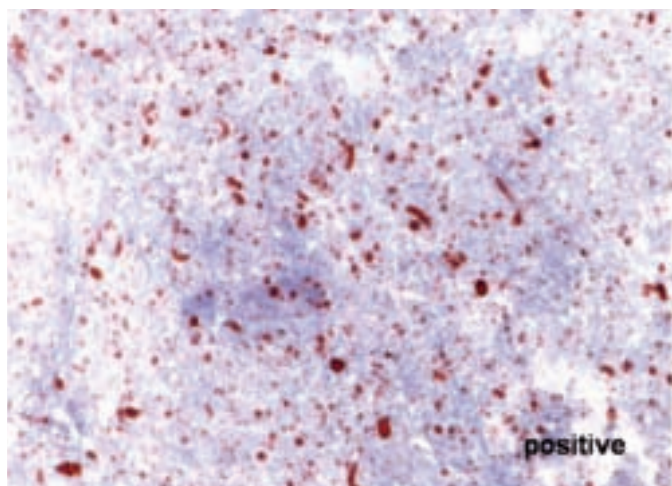
### **Zoonoses**

A study of brucellosis in livestock and humans in Kyrgyzstan indicates that preliminary estimates of the cost of brucellosis to Kyrgyz society range between USD 5 and 15 million per year. Studies on the molecular epidemiology of brucellosis started in cooperation with Kyrgyz and Swiss partners.

Longitudinal studies of dog rabies showed that dog rabies viruses from N'Djaména are similar to each other and belong to the African-2 group, circulating in dogs in different locations of Africa. The direct immunohistochemical test (dRIT, CDC, Atlanta) performs as well as standard immunofluorescence. The main advantage is that it does not need a fluorescence microscope and thus has tremendous potential to be extensively used in peripheral field laboratories throughout Africa and Asia. Willingness to pay for dog rabies vaccination follows empirical observation. While vaccination coverage reaches >70% if dog vaccination is free, it drops to 20% if owners have to pay USD 4.

Over 1,000 cattle were investigated for bovine TB at the abattoir of Sarh (South Chad). The current OIE standard of intradermal testing of cattle is still highly valid, but it might perform better if the cutoff were reduced to 2 mm of skinfold instead of 4 mm. Epidemiological studies are ongoing in Ethiopia to estimate the cost of disease. A new study has begun on TB in animals and humans in the Borana pastoral area of South Ethiopia. As part of the "Constance" project ([www.bvet.admin.ch/gesundheit\\_tiere/00276/00280/index.html?lang=de](http://www.bvet.admin.ch/gesundheit_tiere/00276/00280/index.html?lang=de)) with Germany and Austria, contributions to a risk-based framework of surveillance of avian influenza in Switzerland were made by large-scale questionnaire surveys among poultry holders, emphasising social contact networks and contacts between wild and domestic birds.

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Positive and negative Direct Rapid Immunohistochemical Test (CDC, Atlanta) for rabies not require fluorescence microscopy. (Source: Dürr S et al. *PLoS Negl Trop Dis*. 2008 Mar 26;2(3):e206)

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