Chapter 5
Public and Private Veterinary Services in West and Central Africa: Policy Failures and Opportunities

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Abstract The livestock sector in most African countries, in particular in the Sahel region, remains underexploited. It is traditionally managed in pastoralist systems that best guarantee the environmental sustainability of the arid and semi-arid grasslands, which can be hardly used for agriculture. However, pastoralists are vulnerable to exclusion to social services because they are remote to educational and political centres. The majority of livestock, however, are kept in mixed crop–livestock systems in which livestock have multiple roles such as producing food, generating income, providing manure, producing power, being financial instruments and enhancing social status. Livestock breeding faces many challenges and constraints including transboundary animal diseases (TADs) and increasing waves of droughts due to climate change as well as politically and economically instable states. Despite that Sahelian livestock owners have robust empirical methods to protect their basis of livelihood—their livestock—they need and appreciate quality medicines, vaccines and veterinary services.

Operational veterinary services are at the heart of controlling important livestock diseases to reduce impacts on livelihoods. There are effective control measures such as anthrax vaccination of livestock that also safeguard human health. Veterinary services are equally at the heart of early detection of TADs and surveillance and

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response to epidemic and zoonotic diseases. But how can the services, composed of public and private veterinarians, veterinary technicians, community animal health workers and outreach services, meat inspectors and monitoring/surveillance professionals, better ensure and satisfy the needs of livestock owners, their families and other stakeholders such as public health and rural development? Which roles do international and national policies play?

We review the status of veterinary services in the Sahel over the last 20 years and relate their provided services to overarching policy changes such as the privatisation of veterinary services and external funding schemes and programmes. We conclude on new ways forward such as implementation of intersectoral collaborations of professionals in remote Sahelian zones and needed operational research in optimising services.

Keywords Public and private veterinary services · Livestock systems · International and national policy changes · West and Central Africa

Introduction

Main Livestock Keeping Systems in West and Central Africa

Between 46 and 82% of poor rural households in Asia, Africa and Latin America keep livestock, which generates between 20 and 60% of their incomes (Zezza et al. 2007). Livestock contributes an average of 40% to agricultural gross domestic product (GDP) in West and Central African countries (SWAC-OECD/ECOWAS 2008). The livestock systems in West Africa can be roughly divided into the extensive pastoral systems, mixed crop–livestock systems and the intensified and stall-feeding systems in urban and peri-urban areas (Ly et al. 2010). West Africa carries about 74 million cattle, 270 million sheep and goats and 4.5 million camels; about 13 million pigs and 570 million poultry; and about two million horses and six million donkeys (FAO 2016). Around 18% of all ruminants are kept in pastoral systems. These extensive systems are challenged by social and ecological changes, despite evidence that pastoralism is a viable and sustainable livelihood. They are hotspots of cultural and biological diversity, but need favourable institutional and legal frameworks (Krätli 2016). Among the key ingredients for sustained pastoralism are decentralised governance of natural resources, better locally adapted social services and high flexibility for maintaining mobility. There is still untapped potential to optimise extensive livestock production (Zinsstag et al. 2016). Crop residues are often used by transhumant pastoralist herds that, in return, provide manure for the fields. The majority of livestock, however, are kept in mixed crop–livestock systems. Livestock is raised on (small-scale) farms that produce crop (such as maize, sorghum, millet and rice), vegetables (e.g. cowpea, groundnuts, and soybeans) and tubes (e.g. cassava and yams). In these systems, livestock have multiple roles such as producing food,

generating income, providing manure, producing power, being financial instruments and enhancing social status (Randolph et al. 2007). In the Sahel, the integration of livestock into farming systems increases from North to the more humid South. In the South, vector-borne diseases challenges are more prominent than in the dryer northern zones (Ly et al. 2010). The urban and peri-urban intensified and intensive livestock keeping systems, where resources and feed are imported and food and wastes exported, can better provide the high demand on locally produced livestock products in the cities. They can also enhance the importance of certain infectious diseases, e.g. for poultry and food-borne pathogens and antimicrobial resistances. Peri-urban milk production and ruminant, particularly sheep, fattening units are emerging close to the rapidly growing urban centres to support them with locally produced livestock-sourced food (Bonfoh et al. 2010). Urban and peri-urban livestock production importantly includes commercial (up to industrial-scale) poultry production. Animal feed and other production resources are shipped to the production sites, whereas manure and wastes are transported away from the centres, which makes this production more energy-intensive. Livestock owners' demand for veterinary services varies between the different livestock keeping systems.

Training, Education and Career Pathways of Veterinarians

According to the World Organization for Animal Health (OIE)'s Terrestrial Animal Health Code, the concept of "Veterinary Services" refers to the public or private bodies that implement health protection measures in the territory of a country and the welfare of animals as well as other standards and recommendations of the OIE sanitary code for terrestrial animals. This Code says "[....] Veterinary Services are under the direct management and control of the Veterinary Authority. Organizations, veterinarians and veterinary paraprofessionals in the sector are normally approved by the veterinary authority or authorized by it to perform the public service tasks entrusted to them [....]". This implies that a strong central veterinary authority is needed to manage the different organizations and actors.

In the case of Chad for example, the governmental veterinary services within the OIE definition include three main entities: (1) the Directorate of veterinary services—the central veterinary authority, (2) the decentralised services of the Ministry in charge of Livestock (with provincial delegations and veterinary posts) and (3) the central diagnostic laboratory (*Institut de Recherches en Elevage pour le Développement* "IRED") (DGSV 2017).

Veterinary services in West and Central Africa include both the governmental and non-governmental structures. The private sector organisations are composed of veterinarians, veterinary paraprofessionals and aquatic animal health professionals who are commonly accredited or approved by the veterinary authorities of a country to deliver the mandated objectives (OIE 2016). To note is that community animal health workers (CAHW) have not been endorsed by all countries.

The importance of animal welfare, particularly during transport and slaughter of livestock as well as unauthorised keeping of wild animals, yet needs a legal basis—at minimum the welfare regulations according to OIE standards—in most West and Central African countries (Bourzat et al. 2013). In addition, many countries need assistance to ensure a status when they do not endanger the animal health situation of another country, importantly a neighbouring country. According to OIE estimates, despite noteworthy progress, the veterinary services in the least developed countries (LDCs) and many middle-income countries (which represent together a total of 120 countries) need technical and financial assistance to ensure a satisfactory animal health management—one that does not pose a veterinary health risk to other countries (Pradere 2017).

To build veterinary capacity, OIE member countries (180 countries) can apply for the OIE Tool for the Evaluation of the Performance of the Veterinary Services (PVS). The OIE PVS tool is the main resource for improving global animal health, public health and animal welfare (OIE 2006). The necessary budget to enable developing countries to comply with OIE and WHO standards and control zoonotic diseases has been estimated at between 1.9 to 3.4 billion USD per year in 2011 (Bank 2012). These funds, combined with farm-sector reforms, could considerably reduce the economic impact of animal diseases, pandemic risks and the impact of livestock farming on natural resources and the climate. However, structures of veterinary services that can absorb, manage and implement effectively larger funds are scarce in West and Central Africa.

Key Commitments of "Veterinary Services"

Key elements of *good governance* (within national chains of command) of veterinary services include the maintenance of epidemiosurveillance networks, liaising between public and private sectors, offering of quality veterinary services and doing veterinary education and research (AU-IBAR 2010). AU-IBAR (African Union - Interafrican Bureau for Animal Resources) provides technical leadership and advisory services, facilitates the development and harmonisation of policies, coordinates the development of animal resources, articulates common African positions globally, advocates issues relevant for Africa, analyses and disseminates information and provides strategic support to countries in emergency situations (AU-IBAR 2010).

Among the activities covered by the governmental veterinary services in all countries are (1) the establishment of the legislation, (2) the prevention and control of regulated animal diseases, (3) food safety, (4) the establishment of international certificates for the export of animals or products of animal origin, and (5) border control. These activities fall under the concept of "global public good" (OIE 2016). As to economically most important livestock diseases that severely reduce productivity or those diseases poor livestock owners fear most, diseases that can occur at any time and rapidly eliminate their basis of income (Perry et al. 2002), are important zoonoses and public good transboundary diseases. National veterinary services are

thus typically responsible for ensuring the protection of "public good" animal health, which includes the safety of food products of animal origin, the control of major animal diseases and the quality control of veterinary pharmaceuticals. The control of zoonoses is considered as a public good in that it protects human and animal public health and thus benefits society as a whole (Zinsstag et al. 2011).

Highly contagious animal diseases and epidemics pose an economic threat to livestock producers and the entire agricultural sector and national economies. Their control and elimination is therefore considered as a public good (The World Bank 2010). The veterinary services lie thus at the heart of the global public good represented by animal health systems. However, they cannot fulfil this mission without the appropriate veterinary legislation and the necessary means to enforce them. Veterinary services have a major role to play in matters of animal health and public health in terms of surveillance, early detection (and notification of) and rapid response to animal disease outbreaks, which can include vaccination, bio-security and bio-containment and compensation of farmers (Johnston 2013).

Excludability principles have been used to group animal health services into private good services, e.g. endemic disease control and prevention, sales of drugs and vaccines and clinical services. Hence, the user captures all benefits and common of public good services like the diagnosis, surveillance, movement control and quarantine services for epidemic or zoonotic disease control, control of food-borne diseases and tsetse control (Ahuja 2004; Riviere-Cinnamond 2005). The public good nature of some services does not necessarily imply that the government must take direct responsibility for their delivery. The government may subcontract these services to private organisations (e.g. non-governmental or research or development organisations) and private veterinarians (Stephen and Waltner-Toews 2015).

Our starting point for this chapter was that animal-health systems have been neglected in many parts of the world in the past two decades, leading to institutional weaknesses and information gaps as well as inadequate investments in animal-health-related public goods (FAO 2009). This is particularly evident in remote and rural zones of West and Central Africa, where international organisations and institutes easily find space to implement livestock protection projects without being forced to ask if they also contribute to the strengthening of veterinary services in the countries where they are active.

Rationale, Objectives and Methods

Governments in West and Central Africa have withdrawn importantly from the provision of veterinary and other input services such as high-quality health services in remote zones. Although more professionals are entering the private veterinary business and are playing active roles in immunisation schemes in partnership with the government and producer organisations—the anticipated emergence of private sector provision for the full range of veterinary and advisory goods and services has not been as successful as hoped for West and Central Africa two decades ago. In the

same period, livestock production systems were hindered to develop as hoped as long as there were only low levels of inputs.

Most projects initiated and led by governments failed to create a self-driven development and remained heavily dependent on external funding, despite many good intentions such as stabilising the important livestock production and export markets. The generation of new and continued funding was limited since they had not to seek economic and financial recovery. After the introduction of the World Bank's privatisation policy (De Haan et al. 2001), governmental veterinary services no longer had to make larger investments. Veterinary services may be considered for the past two decades as the most understaffed and under funded services to provide so-called public goods (De Haan et al. 2001). At the same time, poverty reduction was put at the forefront in the design of livestock policies. International policies could easily occupy the vacuum of rigorous national policies.

A thorough assessment of international and national livestock policies in West and Central Africa for the last three decades does not exist, and this chapter does not intend to do so. However, such analyses would help to derive lessons for livestock policy development—and to better guide agreements on regional livestock policies, e.g. within the ECOWAS (Economic Community of West African States) region. It is clear that only regionally harmonised approaches will be successful given the important movements across borders of livestock, people and goods, not to mention animal trade and its role as important factor for diseases transmission in West Africa (Dean et al. 2013).

Low availability and use of veterinary services have allowed the classic endemic infectious diseases to persist. As livestock systems intensified, associated production diseases and syndromes such as mastitis became more important veterinary problems. Because of market segmentation based on food safety concerns, larger volumes of low-quality livestock products passed through informal marketing channels, further compounding the risks of zoonoses and food-borne diseases for low-income consumers (Roesel and Grace 2015). Foot and mouth disease—to name one important transboundary disease—without any veterinary measures such as surveillance, containment and compartmentalisation hinders smallholders to participate in rapidly expanding export markets for livestock products.

Poor access to products, services and information contribute to poor performance, profitability and competiveness and continue to limit the ability of livestock keepers and veterinarians (in a vicious cycle between the two) to address major disease and production constraints. The reduced role of the governments in the provision of veterinary and health services in the context of inability of the private sector to fill the void has led to the resurgence of endemic animal diseases, and reduced livestock productivity in many parts of the Sahel region.

See for example the rapid spread of Ebola in West Africa starting in 2012/13. This was possible because the Ebola epidemic was human to human transmitted (likely after a single index occurrence of a bat-to-human transmission), among others the high mobility of people in the region (also cross-border), but also because of weak health systems which lacked sufficiently trained nurses recognising and reporting

abilities of haemorrhagic fever as well as related knowledge on the local traditional customs of washing dead bodies before burying that caused many new cases.

Here we reflect with two case studies on how international and national policies affected negatively and positively the ability of veterinary services in West and Central Africa to become more proactive in reply to old and newer demands of the veterinary services. Also, we want to reflect on how foreign policies and projects with all initial good intentions influenced the livelihoods of livestock owners in West and Central Africa. We present the case studies of Chad and Côte d'Ivoire. These case studies also depict how international policies led to increased self-responsibility of governments who are at the forefront to guarantee quality and good governance of veterinary services.

Given the opportunities and constraints of veterinary services outlined above, we have formulated the following objectives for this chapter:

1. To highlight the recent history of veterinary services performance and operational capacity in West and Central Africa and their role in international disease elimination programmes
2. To give case examples of failure of veterinary services in the past two decades in West and Central Africa, particularly their relations to international livestock policies
3. To outline feasible goals of public and private veterinary services based on the current laws and financial constraints
4. To depict venues and opportunities of services given the current financial and law contexts

The methods we have used are largely empirical (based on our professional experiences) of veterinarians working in West and Central Africa and not systematically (in terms of systematic review or surveys) to describe performance of veterinary services before and after implementation of international laws and programmes.

Results

Privatisation of Veterinary Services in West and Central Africa: The Unfinished Process

Understaffed and Underfunded

Veterinary field (and laboratory) services are too often chronically understaffed. The hundreds of millions of livestock in a variety of livestock production systems are under the main responsibility of few registered veterinarians in West and Central Africa with all the tasks described above. In Central Africa sub-region, the largest number of registered veterinarians in the public and private sectors was in Cameroon with around 1000 registered veterinarians; meanwhile there are only 250 in Chad,

220 in Niger and about 40 in Gabon. In West Africa sub-region, there were around 250 in Senegal and 198 in Côte d'Ivoire (http://www.rr-africa.oie.int/). Veterinary services largely rely on veterinary technicians and on trained CAHW to cover the minimal requirements of operational veterinary services. In Chad for example, the livestock sector counts for more than 50% of agricultural gross domestic product (GDP), yet the sector receives less than 1% of the governmental budget.

A study undertaken just after the Rift Valley fever outbreak 2006/2007 in Kenya showed that the veterinary sector is understaffed to respond adequately to such an epidemic. The public health sector could deploy five times the staff than the veterinary sector, although the latter had more tasks during the outbreak situation. In addition, the infrastructure of veterinarians to reach pastoral zones was insufficient and central veterinary capacity for diagnosis of RVF was neglected during outbreaks and at the beginning of the outbreak hardly operational to manage the high number of blood samples (Schelling and Kimani 2007).

Next to the PVS tool for planning and analyses, and training courses such as field epidemiology courses (spearheaded by the US Centre for Disease Control and Prevention [CDC]) and laboratory capacity courses organised by the Food and Agriculture Organization (FAO), there are few analytical studies on response capacity of veterinary services in face of an event. This is in contrast to assessments on a more regular basis in the human health sector.

In the past two decades, there was first a declining interest from donors and governments to invest in livestock sector, despite that livestock was at the same time depicted as a route out of poverty (Randolph et al. 2007). More recently, more investments in agriculture, in general, and in livestock, more specifically and particularly in pastoral systems within (rural) development programmes, are seen (ILRI 2010). Still, there is a widening technological gap and underinvestment in research targeting the problems of Sahelian communities in terms of livestock keeping (Ly et al. 2010). Efforts to modernise livestock production have focused mainly on the performance of the animals but have neglected rangeland improvement and management—and they largely failed because they did not involve herders themselves (Leonard 2004).

By encouraging privatisation of veterinary services (de Haan 2004) in the 1990s, structural adjustment in the livestock sector was a leading factor in reshaping the supply of veterinary services. Prior to privatisation, governments have been overstretched in servicing major pastoral areas. Financial rationalisation led to disengagement and disinvestment in public veterinary service delivery systems. Private sector development restructured the economy of the livestock subsector, with new schemes to promote the opening of extension of private veterinary practice while maintaining the community animal health workers. Privatisation of veterinary services was initiated in many parts of Africa and Asia as part of a broader effort to improve animal health delivery in the face of falling governmental expenditure and poor public sector performance (Leonard 2000).

A new branch of private veterinary professionals became present in the livestock sector and more and more involved in public contracting of mandatory immunisation (Ly et al. 2010). Numerous incentive schemes were designed to stimulate the

privatisation process. Essentially, subcontracted veterinarians were effective in the implementation of vaccination campaigns given that the government is committed to subsidise work in more remote zones (de Haan 2004). However, due to high transaction costs in rural areas and fewer subsidies by governments, nowadays private veterinary services rarely are viable in remote and sparsely populated areas of West and Central Africa.

International Efforts to Eradicate and Eliminate Major Livestock Diseases and Lessons Learnt on Sustainability

Following outbreaks of rinderpest that have ravaged most of the African cattle herds in waves during the early 1980s, African States were committed to deploy together with development partners enormous efforts to eradicate this deadly cattle disease (DSV 2005). More than three decades of immense resources were invested to carry out annual mass vaccination campaigns for cattle, followed by serological surveys to evaluate the immunity levels of vaccinated herds and of the status of potential carriage in wildlife until its official declaration of worldwide eradication in 2011 (DSV 2005). The OIE recognised the following disease-free stages for Chad (1) free from rinderpest disease in the western part of the country in May 2004, (2) freedom from disease for the whole national territory in May 2006 and finally (3) freedom from rinderpest infection (definitive status), in May 2010 (DSV 2005). The European Community, as the largest donor, together with others such as FAO with important technical and financial inputs, financed largely the implementation of the Pan-African Rinderpest Campaign (PARC) through the Inter-Bureau of Animal Resources AU-IBAR for a period of 10 years. One should not, however, forget the hardly documented important investments in terms of personnel, resources and knowledge of the African countries.

To reach this "major success story of veterinary medicine", among other many measures, "*cordons sanitaires*" were established to separate East and West African zones of transmission. This has fostered the exchange of information between countries. Among the results of these shared efforts between national and international funding bodies were for the Chadian veterinary services are, at the subregional level, periodic cross-border meetings between the veterinary authorities of the Central African Republic (CAR), Sudan and Chad were annually organised (with funding from PARC) to discuss mutual interests in animal health. These actions enabled the veterinary authorities of the subregion to set up in 1998 a protection zone to establish the health corridor "cordon sanitaire" located in eastern Chad, bordering Sudan and CAR (DSV 2005). After the cross-border agreement, the Chadian authorities could restrict the obligation of vaccination in this protected zone and move to mass sero-surveillance, which led to the building up of good serology services. However, since the governmental veterinary services only focused on mass serological surveys in most regions during several years, livestock owners started to perceive the veterinary technicians as just arriving to bleed their animals without providing any information and without further services—and they never received a

return of information. This triggered among owners of large livestock herds a doubt about the usefulness of veterinarians in general.

As a logical follow-up to the PARC, the Pan African Programme for the Control of Epizootics (PACE), also with important funding of the European Commission, was set up to ensure the control of epizootics with national epidemiological surveillance systems. PACE covered 32 countries in sub-Saharan Africa. One goal put forward was the eradication of Contagious bovine pleuropneumonia (CBPP), which is yet unaccomplished because, among many reasons, a less effective vaccine is available and a cold chain is needed as compared to rinderpest vaccination. Likely also a bit lesser long-term international commitment was available for continued finances of countries (see below). In Chad, the livestock surveillance system, the REPIMAT (*Réseau d'épidémiosurveillance des maladies animales au Tchad*), was set up (AU-IBAR 2010). An effective, sensitive and sustainable animal disease epidemiological surveillance network is the basic element for the management of the animal health in a country and financing of surveillance networks in a sustainable way would be a catalyst for the effectiveness, credibility and conformity to international standards of the national veterinary services (AU-IBAR 2010).

A next large eradication programme to mention is the Strategy for Control and Eradication of PPR (GCES-PPR) developed and piloted by FAO and the OIE Permanent Secretariat on global level, by the AU-IBAR at the regional level and by the Regional Economic Communities (RECs) at subregional level to guide national veterinary services in gradually reducing the prevalence of PPR up to its planned global eradication by 2030. Chad, like other countries in the region, has firmly subscribed to this dynamic—given the promoted worldwide and national importance extrapolated from the rinderpest eradication—and has already adopted its National Strategic Plan for PPR (PNS-PPR) that was validated in August 2017 (Félix 2016).

It should be noted that at the signing of the financing agreement between the European Commission (donor) and the African Union (beneficiary) for the implementation of PACE, it was recommended to the states that the operating costs (from 25% to 50%, and 75%) of African networks should be progressively included in national budgets and that at the end of the programme should be fully covered by national funding (AU-IBAR 2010). Unfortunately, since the closure of PACE at the end of 2006, only very few countries in sub-Saharan Africa draw nowadays from their commitment of increasing funding for surveillance. Most countries struggle to maintain active and passive epidemiological surveillance activities due to lack of means. This critical aspect has been reported by various PVS missions led by the OIE as one of the "weak points" of the national veterinary services in sub-Saharan Africa.

The lessons learned from the eradication of rinderpest and of the sustainability of PACE initiatives should inform policymakers and veterinary authorities of African States to plan well ahead for better control of emerging and re-emerging animal diseases next to the prevailing endemic livestock diseases. Since foot and mouth disease (FMD), *Pest des petits ruminants* (PPR), contagious bovine pleuropneumonia (CBPP), Newcastle disease (ND), Rift valley fever (RVF) and African swine fever (ASF) (DGSV 2017), to name a few, have a substantial economic impact, it seems cost beneficiary to continuously invest in service provision, which makes

services also more sustainable once the big programmes stop. Large international programmes should not only recommend to add national budgets but rather insist in terms of promised outputs on documented increasing matching funds because these will foremost strengthen national veterinary services.

To address these challenges, the following policies must be undertaken by states: (1) budgeting and resource mobilisation for surveillance activities (active and passive) and health prophylaxis; (2) prioritisation of actions to be implemented in the short, medium and long terms; (3) synergies of technical actions among countries with common borders; and (4) capacity building of diagnostic laboratories and training of technicians at all levels (DGSV 2017). Making use of synergies between human and veterinary health services in remote rural zones can strengthen both health systems in terms of delivery and surveillance (Schelling et al. 2005).

Unfortunately, in the more recent events of emergency responses for refugee livestock owners returning to Chad, FAO imported to Chad vaccines mainly to ensure vaccination against CBPP in the bordering regions. Also other vaccines were imported—vaccines that are locally produced by the public veterinary services such as anthrax and blackleg vaccines IRED has invested much in quality control of its vaccine production—and production is a central source of income for veterinary services. Import of vaccines cut veterinary service income. In addition, the fact that the imported vaccines were served free of charge to refugee livestock owners but also to local livestock owners has undermined the efforts of veterinary services, after years of struggle, to maintain generally accepted and stable vaccination fees under what is so-called the cost recovery of vaccines (see below).

Case Studies of Public and Private Veterinary Services in Côte d'Ivoire and Chad

Côte d'Ivoire

As part of the implementation of the structural adjustment policy, Côte d'Ivoire has opted for the privatisation of veterinary services. As a result, the law establishing the National Veterinary Order of Côte d'Ivoire and the Veterinary Code of Ethics was adapted by the Ivorian Parliament in 1988. Privatisation was therefore actually implemented with the opening of the first private veterinary clinics in 1995 with the support of the European Union through the PARC project.

The state's withdrawal from the production and marketing of vaccines as well as the refocusing of its mission in the regulatory and control functions has led to the emergence of private veterinary services who became involved in several sectors such as veterinary pharmacies, urban canine clinics, rural veterinary practitioners and prophylaxis in the format of a health mandate.

The development of a private veterinary drug sector for the distribution of veterinary drugs was authorised. Competition in drug selling was encouraged, but their rapid development in a tight market required regulations for the importation and

distribution of veterinary medicinal products. In 1996, the law on the veterinary drugs was adopted by the national assembly.

Out of pocket payment for all livestock vaccinations, including those that were compulsory, has been introduced. However, it has been applied gradually and on the basis of cost sharing between the state and the farmers. The introduction of the payment by the farmers also made it possible to carry out the campaigns by governmental staff of the Ministry of Livestock. Since payment was based on numbers of vaccinated animals, the livestock owners became the primary interest group in good-quality services. The state's decreased contribution led to a decree on the remuneration of private veterinarians by the state—in the framework of the implementation of veterinary mandates. The mandatories were then forced to buy vaccines from the state and to pay the benefits to the breeders. This became one of the major constraints for private veterinarians to settle in clinics. The number of established veterinary clinics first remained stable but then slightly decreased from 16 to less than 13 between 1996 and 2010.

The distribution of veterinary drugs became the most important activity of private veterinarians and accounted for nearly 60% of turnover. However, this important source of income was challenged by illegal markets in many parts of the country. Private veterinarians were competing with untrained wholesalers who sold directly to breeders. These transgressions persisted because of the lack of the enforcement existing regulatory frameworks and the lack of an official control of the distribution of veterinary drugs.

Between 2011 and 2017, the number of private veterinary clinics doubled from less than 15 veterinarians in 2010 to 30 veterinarians in 2017. This can be explained by the growth in the poultry and swine industry, but also by the issuing of a new veterinary law (*Ordre des vétérinaires*). Veterinarians became engaged in the fight against the illegal distribution of veterinary drugs. Indeed, more than a dozen complaints were taken to courts and illegal deposits were closed. Also, the Economic Community of West African States (ECOWAS) funded during three successive years campaigns against the illegal distribution of veterinary drugs in West Africa.

The privatisation of the veterinary profession in Côte d'Ivoire can be subdivided into three main phases:

- From 1995 to 2000: the fostering of installation of private veterinarians with important financial support (30,000,000 FCFA, equalling about 60,000 USD at that time) for each veterinarian installed).
- From 2000 to 2010: after a first promising increase, a sharp decline of private veterinary clinics took place.
- From 2011 to 2017: the revival of the instalment of private veterinarians without financial support from the state but with improved governance, particularly in the enforcement of the regulations on illegal sales of veterinary drugs.

In conclusion, the enforcement of national laws was a key factor to establish viable veterinary services in Côte d'Ivoire. Law enforcement led to more sustainable private veterinary services than financial incentives in Côte d'Ivoire. The state must also create an environment conducive to the sustainable evolution of the private

veterinary facilities: (1) to enforce health measures; (2) to strengthen the National Order of veterinarians, i.e. extended scope of the sanitary mandate to the control of foodstuffs; and (3) to involve livestock keepers actively in epidemiological surveillance, by promoting and strengthening health defense groups.

Privatisation of Veterinary Services in Chad

In Chad, the process of veterinary privatisation started in 1987 and has been funded by international partners such as the European Commission, the World Bank and others (Arditi and Lainé 1999). In 1988 with the intention to reform the veterinary sector, the Chadian Ministry of Plan and Cooperation signed a letter of intent with the World Bank. These reforms were mainly on the stabilisation of the veterinary workforce by non-replacement of retiring public sector employees and installation of private clinics, the liberalisation of trade for veterinary products; and redefining the roles and functions of the public service sector. In addition, veterinary services were to be offered based on cost recovery. The latter required the training of community animal health workers to deliver basic veterinary services.

To implement all these reforms, legal frameworks were adopted by the signature of several decisions by the Chadian authorities from different sectors such as: (1) Ordinance No. 005/PR/91 establishing the veterinary profession; (2) Decree No. 384/PR/PM/ME/91 regulating the veterinary profession; (3) Decree No. 417/PR/PM/ME/91 regulating the veterinary pharmacy; (4) Decree No. 21/PR/PM/ME/91 laying out the conditions for the assignment of sanitary mandates; (5) Law No. 24/PR/2000 on pharmacies; and (6) Decree of 4 August 2005 relating to veterinary pharmacy in the Republic of Chad.

In 1992, the first eight livestock technicians were endorsed by the National Livestock Project followed in 1993 by granting of an exclusive mandate to eight private veterinarians to carry out the vaccination campaign against rinderpest. "Exclusive" meant that full responsibilities of veterinary zones were assigned to private veterinarians and, in view of excluding competition, the government would not intervene. The following years, the number of veterinarians settled in private clinics increased and reached 28 veterinarians by 2003 who have benefited from financial support as credit up to USD 30,000 (FCFA 15,000,000). This gradual increase in number of veterinarians raised various concerns, which led to the creation of the Union of Private Veterinarians in Chad (UVPT) in 1994 to better help organising the activities of private veterinary services, specifically the prophylactic mandate with vaccinations. Next to the valuable vaccination mandate, the different areas of intervention of private veterinarians were in clinical activities, sales of veterinary products, treatment of animals, training and supervision of breeders and diseases surveillance.

At early implementation, private veterinarians were very interested to fulfil additional tasks of health promotion and increase demand of livestock owners for clinical services in zones where, due to the poor governmental infrastructure and a mandating system, they practically alone had access (Nahar 2000). A contribution from the public health sector to their costs of vaccination delivery first rendered

private veterinary services profit-making. With two private veterinarians working in rural districts of Chad, costs of all expenses for cattle vaccination campaigns for the years 1997–2000 were recorded in detail and verified in successive sessions, if possible with accounts. Vaccination in these years was the main activity of the private veterinarians. The average numbers of vaccinated cattle per year were recorded from detailed vaccination records. In parallel, interviews with pastoralists revealed that it was difficult for livestock owners to cope with the situation that vaccine doses first cost 25 FCFA, then raised to 50, 75 and finally to 100 FCFA. To pay 100 FCFA was finally set for the next years. Livestock owners have praised that prices were stable and they could plan accordingly and have sufficient cash before the arrival of the veterinarians for vaccination of livestock. Mirroring increasing costs to livestock owners, subsidies were reduced.

Without subsidies and a payment of 100 FCFA per dose—the marginal income of private veterinarians per vaccinated livestock was very low. The overall costs of the private veterinarians were composed of variable costs (71.4%) and fixed costs (28.6%) (Table 5.1) (own unpublished data). According to the vaccinated livestock number and the number of different vaccines (anthrax, pasteurellosis and blackleg together during one campaign and CBPP during another) per animal, this resulted in costs of 160 FCFA to vaccinate one animal and in 96 FCFA per vaccine. The income for animals with only one vaccine dose was thus only 4 FCFA. This was too tight to save for new investments (e.g. for replacement of a car). Particularly mandated vaccination campaigns were not beneficial during vaccination campaigns CBPP when only one vaccine was available. Variable and fixed costs of transportation represented 20% of all costs. Indeed, reaching the remote herds and livestock keeping families was perceived by private veterinarians the most difficult obstacle. The reimbursement for collecting samples within the epidemiological surveillance programme did not cover the costs and therefore private veterinarians lost interest to be involved in the surveillance network.

Table 5.1 Cost composition of two private veterinarians in Chad who tried to establish mandated rural veterinary clinics. These costs were contrasted to their incomes that were alone from mandated vaccination campaigns in the years 1997–2000

	Private veterinarians	
Variable (recurrent) costs	FCFA	%
Personnel/administration	11,603,750	27.3
Vaccines	14,092,105	33.1
Transportation	3,205,000	7.5
Cold chain	780,000	1.8
Supplies	711,525	1.7
Total variable costs	30,392,380	71.4
Fixed (non-recurrent) costs		
Vaccines	6,039,474	14.2
Transportation	5,215,333	12.3
Cold chain	150,000	0.4
Buildings	750,000	1.8
Total fixed costs	12,154,807	28.6

After an abrupt implementation of privatisation, private veterinarians lack nowadays a backing-up by a clearer legal framework as well as more political and financial commitment of the government. Clinical services of veterinarians remain weak (breeders are willing to pay for drugs and vaccines, but not for proficiency services) and subsidised tasks such as compulsory vaccination, surveillance, meat inspection (to note is that at least 80% of food is traded in informal markets, thus per definition without inspection (Roesel and Grace 2015)), nor training fully occupy private veterinarians. The cessation of programmes such as PACE guaranteeing subsidies (as for vaccination against CBPP) strongly challenged the profitability of private veterinarians in less populated zones.

To date, only one veterinarian still works in a private clinic in Chad—the others went to the government or internationally and periodically funded programmes—showing a failure of the implementation of the sanitary mandate by the government in the last two decades. Among the main reasons of this failure were the non-enforcement of laws and regulations. Unlike in Côte d'Ivoire, veterinary drug sell controls were never established and thus there was a rapid proliferation of street vendors for veterinary drugs. Another reason of failure to set up private practices was the stop of financial support rendering services in remote rural zones no longer viable for a private business. Also, public entities did not easily accept the new situation where the private veterinarians would take over their duties—they were still present, but no longer had a mandate in the huge zones assigned to mandated private veterinarians. Further was the fact that livestock producers were not sufficiently involved in the privatisation process, not to mention the impact of the changing vaccination fees to be paid based on cost recovery. Finally, Chad experienced great numbers of refugee breeders, who have benefited from the assistance of the humanitarian sector and from the hosting country. The refugees have changed the mobility patterns of pastoralists which also negatively impacted on the activities of private veterinarians throughout the national territory.

Given that the privatisation policies have forced the state to retract from mandated zones and the private veterinarians were de facto no longer present, this left for many years huge zones without veterinary services. The government—to protect its national good—nowadays tries to fill the gaps again. However, in the last 20 years, governmental investments in veterinary services such as training of veterinary technicians were minimal, and there is a lack nowadays in veterinary health personnel, infrastructure and funding schemes.

Opportunities

Conventional public health and veterinary strategies often need to be complemented and in some cases replaced by alternative strategies to more effectively reach remote zones, for example, by public contracting of private agents, competent non-governmental organisations (NGOs) and civil society organisations to deliver selected services (Ahuja 2004). Community animal health programmes sought and seek to complement and extend conventional delivery systems to (partly or mostly)

fill the gaps in chronically underserved rural areas. These programmes give (short-term) training in basic veterinary techniques to community members. Community animal health workers (CAHWs, sometimes also referred to as paraveterinarians) can have a substantial impact on livestock morbidity and mortality through the treatment or prevention of a limited range of animal health problems (Catley et al. 2002), particularly in remote zones of West and Central Africa and pastoral zones in the Sahel. Essentially, the main success business model is built on the fact that they are within the communities and thus more easily accessible. As shown below—this can be an advantage but also a disadvantage if no budgetary follow-up and quality control mechanisms are established as additional component of such an initial training programme. Their legal support is lacking in several countries (Catley et al. 2005), whereas in some African countries CAHWs have received extra training (sometimes up to certificate level) for 3 months up to 1 year. These cadres are referred to as Animal Health Assistants or Auxiliaries (AHAs), Nomadic Animal Health Auxiliaries (NAHAs) or Veterinary Supervisors (Simpkin 2005).

CAHWs can also be at the forefront of revised veterinary and One Health surveillance (Abakar et al. 2016). There are many opportunities and advantages of CAHWs in pastoral zones mainly because they are capable of moving with livestock herds and travelling to fixed-point outlets for veterinary drugs. Although some pastoral communities have been exposed to free or heavily subsidised veterinary services, they usually acknowledge the rationale for payment of veterinary services (Catley 1999).

In West and Central Africa, thousands of CAHWs have been trained in the past two decades. A key factor for success of continued demand and effectiveness of CAHWs is that community members to be trained are preferably selected by their community for broader acceptance. Other factors of successful CAHW programmes include community involvement in the design and implementation and involvement of the private and governmental sectors to supply and supervise CAHWs (Catley et al. 2005). Supervision is crucial to ensure quality (access and quality of services is commonly a major concern of livestock keepers) but also to follow up on book-keeping. If they do not sell their services also to relatives, income is missing to buy new drugs that guarantees sustained good-quality services. Another important aspect is quality assurance so that customers, who have less knowledge and information than the provider of animal health services, are willing to pay for services that potentially improve their livestock's health (Leonard 2000). Pastoralists in Chad sought that CAHWs can show renewed certificates as a way to distinguish between those with a follow-up in the veterinary system (quality assurance) and those who operate on their own. CAHWs often work also (sometimes on part-time arrangements) in partnership with the private professional segment. The professionals ensure good practice and the arrangement is an alternative model for the development of private sector delivery systems.

In conclusion, any programme training CAHWs must have a plan on how to sustainably follow up on their trainees. Despite that they can fill in gaps of veterinary service delivery and surveillance of TADs with documented good mid-term

outcomes, without continued investments for several years after initial training, programmes should be careful to train new CAHWs.

Public–Private Partnerships and the Role of Producer Organisations in Veterinary Service Delivery

As mentioned earlier, almost all West and Central African countries were committed to privatisation of veterinary services in the beginning of the 1990s. However, many difficulties occurred during this process especially with regard to cost recovery of vaccination. In the case of Chad for instance, one can mention among others the arrival of high numbers of refugee breeders from Sudan to eastern Chad at the beginning of the Darfur security crisis in 2003 and then from the Central African Republic (CAR) in 2014 in the southern part of the country. Free of charge vaccination of livestock of the refugees from CAR and of locals started in May 2015 in the Southern regions—implemented by the Emergency Support Project for the improvement of animal health and with support from FAO. This operation made it difficult to recover costs in the provision of veterinary services (private or governmental). In addition, local livestock owners did not necessarily want free vaccines after they have since many years accepted that paying the stable 100 FCFA is also a sort of quality criteria. Importation of vaccines from abroad reduced the income of the Chadian veterinary services who locally produce some vaccines.

Strong *producer organisations* can offer an efficient tool for delivering animal health services, although some attention needs to be paid to the fact that mixing of marketing and service functions may lead to an undesirable outcome of sharing responsibilities between the public and private sectors. In some countries, farmer cooperative structures are still yet in transition from an era of state control to autonomous management. However, where established with backup of good agricultural organisations, they run well for the benefits of families.

Private industry makes available their commodity chains or market networks to producer organisations for provision of services (including financial/micro-credit services) and to establish a pastoralist dialogue platform. This could be supported by programmes such as the World Overview of Pastoral Approaches and Technology (WOPAT) (Bonfoh et al. 2008) and also by other stakeholders seeking to reach the remote agricultural zones such as public health actors expanding the Universal Health Care coverage, which is long sought to be effectively implemented in several countries of West and Central Africa. To include agricultural organisations that are better represented in rural zones when compared to the few professionals—and to show synergies on how to better reach together remote populations with services—is currently being debated.

Intersectoral Cooperation for Service Delivery and Surveillance

OIE, as the "guardian of the Codes", took some time to consider whether embarking on a One Health path was realistic and appropriate (as also did WHO). Once OIE became committed to the concept (2008 onwards), the amplification of One Health approaches across the global network of the veterinary services has been impressive, with the veterinary profession widely promoting One Health to address issues such as food safety, food security, antimicrobial resistance, climate change and the human–animal bond. One Health is still driving strong today—also because—after the avian influenza crisis and the international organisations strongly promoting One Health—it is nowadays no longer perceived as a top-down approach thanks to various well-documented bottom-up projects (such as that joint vaccination services for mobile pastoralists increase the efficiency of both sectors to reach these communities) and evidence on its added value (Zinsstag et al. 2015). The veterinary profession within One Health remains a strong advocate of multidisciplinary approaches to solving the complex challenges of global health and to be in a position to provide decisive leadership (Okello et al. 2015). However, to make One Health more operational for the good of veterinary services, more evidence that integrated human and animal surveillance is more efficient to detect early disease events and that costs can be saved is needed. The potential of the added value of One Health seems to be huge, but we need next to theoretical thinking more evaluated implementation efforts.

The Way Forward

There is a need for more task-sharing between the public and private sectors which, in return, would enhance effectiveness of service delivery to remote zones with shared responsibility. Given the fact that privatisation processes still faces many challenges in West and Central African countries, governments need to invest more in enforcing laws that protect both public and private goods as part of their duties to ensure good quality of veterinary services and augment animal production. Good quality of veterinary services could not be guaranteed without qualified veterinarians in the field supervising the vaccination activities and providing other animal health-related needs of livestock owners at cost recovery and still profitable for private veterinarians.

In countries where the private veterinary sector is not well developed, like Chad for example, public services also carry out animal care activities (consultations, dispensing drugs, surgery, counselling). These activities are not part of a market good and are not included in the OIE definition of public veterinary services. The importance of the concept of "animal welfare", which is often limited to the welfare of animals during transport and slaughter, should be noted. Basic measures of animal welfare according to OIE standards must be taken into account in legislation. However, the public services must withdraw (to avoid any unfair

competition) from these activities as soon as a private person mandates for them also if they cannot guarantee their implementation. In view of the foregoing, one of the essential levers for ensuring the sustainability of the veterinary profession, particularly the private clinicians, is the improvement of the politico-legal environment. It is important to establish a favourable legal and regulatory environment. A more systemic review of issued, implemented and missing, but possibly influential, veterinary laws is needed at national and international levels.

Livestock owners must be included in the process of controlling and eliminating animal diseases such as PPR. Their inclusion would allow them to define their needs of clinical veterinary services next to drugs and vaccinations. Making use of synergies between human and veterinary health services in remote rural zones can strengthen both health systems in terms of delivery and surveillance. All larger livestock programmes should be made responsible that they plan for and show how they strengthen national veterinary services next to safeguarding the livestock health. This should be defined in the way also how governments are nudged themselves into more investments in capacity and institution building at all levels and in setting up new public–private partnerships.

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