

# **Rift Valley Fever an emerging threat to livestock trade and food security in the Horn of Africa: A review**

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## **Abstract**

Rift Valley Fever (RVF), an insect-borne viral zoonotic disease caused by a member of the Phlebovirus genus of the family Bunyaviridae, was first recognised in the Rift Valley of Kenya in the early 1930s. Since then, several epidemics of RVF have occurred in northern, southern and now eastern Africa becoming a continental problem. The epidemics that occurred in Egypt in 1977–78 and recent human and livestock cases in Yemen and Saudi Arabia (in September 2000) indicated the potential for the disease to spread to other inter-tropical regions of the world outside African continent. An embargo on livestock export by Gulf countries has brought in food insecurity in the East African countries due to indirect socio-economic mechanisms and impact of the ban on pastoralists household economy. Though food insecurity in the Horn of Africa is a longstanding problem, the recent bans imposed on eight countries, which are not yet recovered from the effects of recent droughts has further exacerbated the situation. Between September and December 2000, livestock export dropped by 92% in Somalia. According to FSAU/FEWS (2001), the estimated total loss of income at the Somali owner/producer level (including livestock originated from eastern Ethiopia), reached 20–30 millions of USD. This figure does not include the reduced government revenue from livestock trade taxes. In Somalia, about 80% of foreign exchange earned from livestock exports are used to import basic food items and other commodities. The effect of livestock export ban was further compounded due to the decrease in imported commodities. This review emphasises on epidemiology and risk of RVF, and the impact on the future of the livestock economy and pastoralists household economy in the Horn of Africa; underscores the consequence on food security; analyses the current situation in a region already with multifaceted crises viewed against international experience; and forward recommendations to the problem associated with RVF.

**Keywords:** Rift Valley Fever; Epidemiology; Livestock Trade; Food Security; Economic impact; Policy implications; Recommendations; Horn of Africa; Early Warning System

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## 1. Introduction

In the Horn of Africa, where 160 million people live, more than 40% (about 70 million) of the people suffer from chronic food insecurity (FAO, 2001). Drought, conflicts, poverty and population growth are some of the major underlying causes of food insecurity. Other natural disasters such as floods, locusts or contagious human and animal diseases, can predispose people to food insecurity. Among livestock diseases, the livestock export embargo due to Rift Valley Fever (RVF) has become one of the most important constraints to food security in the Horn countries in recent years.

### 1.1 The disease and its consequences

RVF is a peracute or acute insect-borne disease of livestock and human beings caused by a member of the *Phlebovirus* genus of the family *Bunyaviridae* (Radostits *et al.*, 1994). The first indication of development of an epidemic is frequently the abortion of sheep. Signs of the disease in animals tend to be non-specific, making it difficult to recognise individual cases of RVF. The simultaneous occurrence of numerous cases of abortion and disease in ruminants, together with disease of humans, following ecological and meteorological changes such as heavy and prolonged rainfall or in the presence of irrigation schemes, is characteristic of RVF.

The disease generally leads to export bans (Embargo) due to its position in the OIE disease list A and international regulations or regional agreements on prerequisite conditions for livestock trade. Consequently, embargo on livestock export is hampering food security of livestock producers especially those households who relies on only livestock economy and therefore cannot generate cash from trade. Moreover, it affects the various scales of any nation macro and meso-economy when mainly relying on livestock production and trade (% of Gross Domestic Product) and additionally has negative effects on all commodity sectors linked to livestock sector. To lift any sanitary-caused ban it necessitates negotiating reopening of markets based on information on epidemiological status and risk assessment and it has high transaction costs. To recover markets rooms after a ban is lifted is a tough task for the whole livestock sector commodity chain. It is not the only disease where certification is asked for by importing countries and as noticed by Ostanello *et al.* (1999) necessary control of other diseases which are prevalent in the Africa Horn (like Brucellosis in Somalia in small ruminants) was quite common leading to chronic negotiation and technical problems for exporting.

### 1.2 Transmission

Many species of mosquito biologically transmit RVF virus and non-vector transmission of the virus in livestock is also possible mechanically. Enzootic status of the disease due to persistence of the virus by transovarian transmission in a zoophilic Aedine mosquitoes that oviposit at edge of standing water which explicit the sustainable infection from a year to another has been described (Davies and Nunn, 1998; Fontenille, 1998).

Transmission to humans occurs via mosquito bites, inhalation of aerosols, slaughtering and necropsy procedures on infected animals. Milk consumption from infected animals is known to be an important transmission route to human beings especially in pastoral communities where milk is a major component of the diet.

Introduction of the virus to long distant countries such as Egypt (1977/78) and Iraq (July 2001) might be due to the arrivals of viraemic people, infected livestock, contact of humans

slaughtering or handling tissues, transport of infected mosquitoes by plane and wind-borne movement of mosquitoes (EMPRESS/FAO, 1998; ProMED, 2001).

### 1.3. Historical background in Africa

RVF appeared to be limited to Africa. It was recognised first in the Rift Valley of Kenya at the turn of 20<sup>th</sup> century (clinical signs of the disease was first observed in Kenya in 1913 Naivasha Lake, Rift Valley on ovine) but the agent was not isolated until 1931. In 1987, the disease was reported for the first time in Western Africa (OIE, 2000). Most epidemics have occurred in eastern and southern Africa and, until 1977, the furthest north that the disease was known to have occurred was the Sudan. Up to 1973 the disease was considered as a normal animal disease and not a human threat but during 1977 and 1978, a major epidemic occurred in the Nile delta and valley in Egypt leading to 18 000 human clinical cases out of which 600 died. A severe epidemic affected the Senegal River basin in Mauritania and Senegal in 1987 (EMPRES/FAO, 1998) with the result of 1000 clinical cases out of which about 100 died. All have had major public health impact and have changed the perception of the disease to a pure zoonotic one and with regard to its spreading capacity. The epidemics in Egypt in the 1977 (WHO, 1982) and 1993 (EMPRES/FAO, 1998) as first to pass the Saharan border have signalled that the potential exists for spread to other regions of the world outside the African continent. It was predicted in 1982 that next to Egypt, Middle East receptive areas would most likely be affected by RVF epizootic (WHO, 1982).

An outbreak in Kenya, Somalia, and Tanzania during 1997 to 1998 involved an estimated 89,000 human cases. During the same period, there were rumours and hypothesis that the epidemic cases had been in Afar and Somali region in Ethiopia. In September 2000, RVF was reported for the first time outside Africa reaching Middle East (ProMED BBC, 2000) and having lead to death of 16 human beings. According to the report of 25<sup>th</sup> September 2000, RVF virus has killed 10,768 sheep, cows and camels in Jizan (a town in Saudi Arabia near border to Yemen) and as many as 16,212 sheep have aborted and 153,000 animals were treated against the disease. As of 26 October 2000, the Ministry of Health of Saudi Arabia reported 443 human cases of RVF with 88 deaths. In Yemen, 97 people have died and 1,797 animals have perished (ProMED, 2000). The area covered is indicated on Maps 1 and 2 (Source: OIE FAO Internet site, 2001).

An internet report of BBC on 25 September 2000 showed that following an outbreak of RVF in mid-September six Gulf states banned livestock imports from eight East African countries and Nigeria to prevent the spread of the viral disease, which has drawn the attention of the affected countries. An assessment by FSAU (Food Security Assessment Unit) has warned that the ban to result a serious food insecurity in the Horn of Africa (Flash, Issue 6-30 November, 2000). Very recently (July 2001), unconfirmed cases of RVF have been reported in Iraq (ProMED, 30 July 2001), which resulted an embargo on livestock import, by Saudi Arabia from Iraq. In general, the disease has shown its potential of spreading to other neighbouring countries of Southern Europe.

This review emphasises on the risk of RVF on the future livestock economy and consequent food security in the Horn of Africa and analyses the current situation in severely suffering regions. Mechanisms and concepts of food security and insecurity and how the current ban affects food security of the agro-pastoralists and pastoralists are discussed and recommendations are forwarded based on international experience and local context.

## **2. Factors influencing RVF control and highlights of socio-economic studies in Afar and Somali regions**

The reasons and rationale to decide export or import bans (embargos) as technical defensive measures depends upon the position of a given country (or two associated when bilateral export-import is considered) with regard to the disease, and on economic consequences of whether its introduction or spread for the country which decides the ban. It also depends on the type and quality of indicators that are available to help the decision and the negotiation when no laws or multilateral or bilateral trade regulation are applicable or to refer to international bodies and regulation when international regulations do exist and when arbitration is needed. The current or expected expression of the disease will also affect the decision, whether it affects or not people (as a zoonotic threat). One can see in **Fig. 1** how the sequences of the disease (as a biological event) and bans (decision from countries) have been the last years and therefore affecting in a different manner the economy of livestock production and trade.

In the Horn of Africa pastoral areas have contrasting rainy seasons which livestock systems and some crop production are relying on. In Afar a normal season is made of 4 seasons: *Sugum* (February – April) represents short rainy season with irregular patterns, *Cagay* (May – July) hot dry and difficult season, *Karma* (August – September) is the long rainy season, *Jilaal* (November – January) represents the dry cold season. Water points are generally rivers (perennial and semi-perennial), wells, water collections (artificial and natural ponds), and boreholes.

Concentrations of livestock are mainly due to transhumance movements in some well-known areas (DoQQ'A, a grazing area at the escarpment between highlands and lowlands, or KeLO, close to the Awash river) or to irrigation scheme where people concentrate in semi-urban habitats (Dubti area). Concentrations are incommensurably reinforced when grazing conditions are difficult (when all people are intending to share the same restricted grazing area and obviously the same water points). Nevertheless, there are differences between livestock species management, cattle and camels being the species that reach the most remote areas (100 km from water point) as compared to small ruminants (radius 30-40 km from the water point, having access every 3 days to the water) and camels being the species that needs less contact with watering points (can be raised at a distance of 10 days walking from a water point). These figures are given to describe and explain the density of contacts between livestock, people and the water points where mosquitoes can develop under certain conditions and to illustrate some food security strategies that pastoralists adopt in a given context. It is obvious that livestock species structure (composition of the herd) within herd or within a region plays an important role as a risk factor to explain frequency of contact with water points, as it plays an important role in the economic diversification of pastoralists (large ruminants as assets animal, shoats as cash animals, all animals being sold). Afar economic diversification is also provided by additional crop production on river banks or irrigated schemes and is a matter of food security for agro-pastoralists relying on both livestock and crop activities.

In the Somali region one may consider the classic 4 seasons: *Jilaal* (long hot and dry season December – March), *Gu* (long rainy season April – mid-July), *Haga* (short dry season, July–September), *Deyr* (short rainy season October – mid-December). The bimodal rainfall patterns are generalised in the area except in mountainous areas of the region (Shinile and Jijiga zones) where during *Haga*, these zones get rains equivalent to the *Kiremt* of highlands consequently offering a complete sequence of rain from place to place in the same region in which many mosquitoes bloom. Rainy seasons fill up the traditional water reserves (of Somali livestock owners) such as the *birkads* (artificially-made water ponds covered with roofs), hand dug wells, and also contribute to the filling up of any water collection or rivers (Wabe Shebelle). Inhabitants are concentrated along the Wabe Shebelle where they cultivate on riverbanks or in irrigation schemes. In some periurban areas agro-pastoralism tends to substitute or complement pure pastoralism when some agricultural activity is allowed. Figure 5 displays a typical agricultural

calendar from Kebri Dehar periurban area with dependency patterns of producers given their economic activity.

In addition, the altitudinal transhumance from lowlands to highlands which are specific to the Horn of Africa are more and less frequent whether in Somali region with cyclic contact with Harrargue mountains in drought-prone conditions or in Afar with normal yearly contacts with highlands at the escarpment and are characteristics that play a role when assessing the variety of contacts between livestock from different origins.

Finally in order to scale up the description of ecological and meteorological conditions facilitating RVF introduction or spread at a larger geographical basis, one may consider the sequences of rainy seasons within sub-Saharan Africa (SSA), within the Horn of Africa and between Africa and Middle East to assess the risks of transmission between countries and the risk of a ban imposition. Moreover Yemen and Saudi Arabia have suffered heavy rainy seasons (giving a high risk context for mosquitoes bloom) at the time when the Horn of Africa had dry season (and therefore no risk for mosquito bloom).

Finally one may summarise risks factors for introduction, or passage from an enzootic status of RVF to an epidemic and eventually spread (whatever the area of concern in a given market shed), therefore leading to a ban and an economic stress for pastoralists:

- The change in meteorological patterns (rainfall, and their consequences, flooding) which contributes to cyclically maintain water collection in a more sustainable way
- The presence of livestock and cross-border and local movements of pastoralists with their animals in search of water and pasture which favour contacts with infected mosquitoes
- The dependence of livestock owners in pastoral areas on export trade, which lead to the utilisation of traditional livestock marketing corridors or market places where animals do concentrate, and the co-existence of domestic market.
- The presence of concentration of people in some areas neighbouring irrigation schemes
- Lack of early ground information on occurrence of disorders due to lack of contacts between pastoralists and veterinary services lack of surveillance and diagnostic capacity in pastoral areas, lack of EWS “Early Warning System” and sentinels networks in general
- The lack of comprehensive information systems assembling ground information schemes data with satellites-provided data
- The existence of numerous species of mechanical transmitters such as biting flies and other mosquitoes in the region and lack of infrastructure to control them after periodical torrential rains resulting in the flooding any region
- The recurrent drought stress and the presence of traditional water collections which are necessary to cope with dry seasons including governmental or NGO’s intervention in building huge ponds with the attempt of harvesting water could favour multiplication of mosquitoes in the region.
- The lack of efficient control tools (vaccines) against RVF

### **3. Effects of RVF on livestock trade and on ultimate food security**

Impact of RVF or of RVF ban should be assessed at various levels of an economy, micro, meso, or macro levels being standards for loss and gain assessment. The figures which results from such

an exercise would give a better figure of who is gaining and losing from the ban, and for how much using financial indicators (USD, ) or non financial indicators (stock of livestock unsold, etc.). As usual in economic assessment the point of view, which is chosen to apply a given methodology for calculation, is essential and can slightly change conclusions.

The RVF has been confined to Africa until the recent report of human and animal cases in September 2000 in the Gulf States (Yemen and Saudi Arabia) (Flash, 2000). The recent ban of September 2000 when compared with the last ban (i.e. in February 1998), there are important differences, which suggest that the worst effects of the last ban will be felt more quickly and severely this time also due to the co-existence of recent drought (April 2000) which has severely affected pastoralists economy – the timing of the ban's imposition (see **Figs. 1 and 3**) and the lack of alternative domestic or international markets are two such key points. At this point one may remark that pastoralists who rely 100% on export trade (some Somali groups) may suffer a lot whereas pastoralists who are more connected to domestic markets (Afar exchanging significant number of cattle with highlands) or less specialised on livestock (degree of diversification in agriculture) may be less sensitive to the ban. Since the ban has not been lifted, the effects are felt during the dry *Jilaal* season\* in both the Ethiopian and Somaliland pastoral regions, which have added another threat to the already difficult season. As has been analysed by Flash (2000), during this season, the seasonal off-take and pastoralists' purchased food consumption requirements are at their highest level, whatever level may have reached some groups with regards to the degree of diversification from pastoralism into agro-pastoralism (Fig. 2). This year, as in recent years, this peak in off-take would also coincide with a peak in demand as a result of the *Haj* pilgrimage (Focus, 2000, see **Figure 1**). It is the season when pastoralists trade an important number of animals for the *Haj* traditional sheep slaughtering in Muslim countries. Comparisons about ban patterns and impact are made:

1. In analysing the **timing** of the ban, in recent years the livestock exports has seen demand and sales increase from about October to reach a first peak in December (*Ramadan*) leading to a second peak in February (*Haj*) (Focus, 2000). The 1998/99 ban was imposed in February, following the first peak and several months after increasing export sales. Therefore many months of revenue had already been generated. In contrast, the current ban has been imposed after 4-6 months of seasonally low sales when, normally, prices and demand would have expected to pick up. This would represent an impact with a price and volume effect.
2. During the 1998/99, there was a **short grace period** after which the ban was imposed, which allowed a large volume of animals to be exported in a limited period of time. The current ban was imposed with no notice, which pose the problem of proper application of international regulations and of arbitrator role of international bodies (WTO-OIE-SPS) resulting in the return of several ships that had already set sale for Saudi Arabia.
3. In the previous ban (i.e. in 1998/99) there were **alternative international markets** since only Saudi Arabia imposed the previous ban. Consequently a lot of livestock were still exported via Yemen to Saudi Arabia. While numbers sold and prices of the exported animals were still lower than normal, there was at least a market. – It is believed that the more distant markets in Region V, Ethiopia, were more affected by the past ban. The current ban, in stark contrast, appears to be much more comprehensive with all states in the Arabian Peninsula involved, allowing little or no possibility for alternative markets in the Gulf, the livestock domestic market being the only alternative with informal and illegal contraband export.

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\* *Jilaal* season (January – March/April); *Deyr* (October – December)

4. **Prior conditions** – the 1998/99 ban was imposed following very good El Niño rains, which resulted in good water and pasture availability for some time thereafter. This may have helped to absorb the greater numbers of animals that could not be exported and that were kept in host areas with a limited impact on the environment. The current ban is imposed after a period of regional drought (Somalia, Ethiopia). Although Northwest Somalia has not in general (there are pockets) had significantly below normal rains in the last two years, drought in Ethiopia had caused high migrations into Somaliland causing serious pasture depletion in places. With the imposition of the ban, planned *Haj* and *Ramadan* export-related off-takes may be adding to the strain on the rangeland allowing significant degradation of the environment.

The most obvious and immediate impact of the ban is a reduction in the demand (volume) and prices for livestock resulting in reduced pastoral income. One can see in Fig. 4 the mechanisms of food insecurity when household economy is affected by livestock trade limitation due to ban. Stoppage of sales of export quality animals was followed by a plunge in local quality animal prices in most important markets (less value of animals against cereals) and was accompanied by drought effect on cereal prices. As a first quick response of the markets to the ban, livestock prices continue to fall (5-10% in Garowe and Bosasso to 30-50% in Hargeisa and Burao/Yirowe in Somalia) with slight difference relatively to the species (sheep and goats highly affected see Fig. 2 terms of trade in Ogaden). Pastoralists experienced a double shock when the market for export quality animals disappeared and prices for local livestock suddenly dropped. Those pastoralists who have export quality goat can sell quickly in the local markets and improve their food accessibility by buying cereals from the same markets. Herders are still holding unsold animals as assets, anticipating a lifting of the ban (Focus, 2000). Since income is basically used to buy complementary cereals and other commodities, lack of income has generated inappropriate diet, and malnutrition depending upon the degree of coping strategies that were used. Moreover the cereals price may increase in a significant manner leading to more difficulties for pastoralists to buy crops (Fig. 2 where terms of trade LS against cereal is shown during April to August 2000 in Kebri Dehar area) for their diet and the term of trade between cereals and LS is generally considered as a major indicator of risk for food insecurity in the exchange economy. Formerly terms of trade during the last drought crisis in April 2000 having recently shifted to non favourable as normally occurs during a crisis it has led to erosion of purchasing power of most pastoralists. The ban consequently contributes to increase vulnerability of some pastoralists groups and reduce overall purchasing power and quality of diets to the minimum. As a result the impact of the ban could be assessed at micro-economic level basically based on welfare indicators, nutritional indicators, as well financial (income or assets quantity), or at society level when dealing with environmental externalities.

Focus (2000) has analysed a mitigating factors and long coping mechanisms for food security. These include economic diversification, which in turn should depend on the type of food economy group and its geographical location:

- Diversification and change of diet: Increase in meat consumption among pastoralists; Increase in fishing among people living in coastal regions and where such resource exists
- Diversification of their production economy: Increase in commercial charcoal burning in some potential regions; Increase in chat production among agro-pastoralists, Increase in frankincense exports among pastoral groups
- Diversification of their markets: Increase of livestock export to other neighbourhood countries or high price competition on domestic market; and to domestic markets

According to FEWS (2001), the ban on the export-quality livestock to Arabian Peninsula and Persian Gulf countries from Somalia is being felt throughout the country. On average, livestock exports dropped by 92 percent between September and December 2000. All those whose livelihoods depend on livestock trade, such as livestock traders, brokers, assemblers and transporters are virtually jobless. This is figuring out a second level of indicators for impact assessment, assessment at the commodity sector level (commodity chain such as meat and livestock, Fabre *et al.* 1997).

In addition to the micro-economic and meso-economic level one may calculate the impact at the national GDP level signing the loss for the country as a whole (macro-economic). The governmental institutions whose economies are based almost exclusively on the livestock exports and port revenues (taxes, levies) from the ports are in deep financial and social crisis. As a result of the livestock trade embargo, the overwhelming majority of the pastoralists in the region are not likely to be able to pay for water from bore holes and wells for their livestock in the future neither for other commodities. It will also be difficult for them to sustain their families because of lack of money to buy food and non-food items. The same is true for pastoralists of Somali Region in Ethiopia as has already been shown that over 80% of livestock exported through various ports of Somali to the Gulf countries are from the Ethiopian pastoralists through illegal route.

#### **4. Food security concepts with regard to level of analysis in pastoral areas**

The report of EWS (2001) by DPPC (disaster prevention and preparedness commission) of Ethiopia indicated that out of the total 1.57 million needy people in the pastoral areas of Ethiopia, about 1.1 million people are of the Somali and Afar regions. EWS (2001) reported many people of the pastoral areas over 30% of the population are estimated to require food assistance (e.g. In Gode zone over 45% people requires assistance). The percentage of needy people would increase if the livestock export ban continues for longer time.

What ever the level of affect of the ban on livestock sales, food insecurity as a major consequence is an issue that relies on theoretical background.

Food security is a complex concept which perception has evolved from time to time. Firstly, food production and consequent supply shortage has been the main reason mobilised to explain food insecurity (first famine theory from Malthus cited by Azoulay *et al.* (1993), linking to the economy of production). Nevertheless, many evidences are given this days showing that food insecurity can increase when food production increases. Therefore, accessibility to food became a major causative factor additional to food production in the 70th's opening debates on the exchange economy concept. Access to food was thus not only deals with food products and food production factors ownership (and as such access to food produced at household level) but linked to capacity to exchange goods and commodity as well (the economy of exchange, within products markets and money markets as well, linking households for local exchange or linking all stakeholders into one commodity sector or marketing chain). Today the Food security concept is made of three main components: **food availability** (whatever locally produced or imported food products), **geographical and economic access** (financial accessibility) to markets and other food supply places, **supply system sustainability or stability** at supplying food products along time and over national territory. One may try to dismantle the various flows and boxes of the household economy to better target where any economic stress like a ban can affect the pastoralists (**Fig. 4**).

Three main outcomes of the RVF Ban can be summarised as follows:

1. If drought was co-existing to the ban as year 2000 ban, crop and livestock production was affected reducing the amount of food locally produced and adding

another stress on crop production and crop prices, amplified by the time effect (in various pastoral and agro-pastoral groups complementary seasonal patterns of crop harvest and livestock sales see **Fig. 5 and 2**).

2. Economic access is being reduced when sales of livestock are made impossible or at very low price reducing the purchasing power of pastoralists to buy cereals at high price, and terms of trade being reversed (Figure 2). Moreover, migrations due to drought stress have forced pastoralists to move far from classic market places rendering geographical access to market places and sales of animals or purchase of foodstuff less easy.

3. The commodity sectors (crops and livestock marketing chains) have been suffering due to meso and macro economic stress including RVF ban and leading to disappearance of some stakeholders resigning from their activity due to the lack of profitability of the business. This is for e.g. due to lack of merchants bringing cereals to pastoral markets and lack of transportation means to load animals to domestic markets. Reduction of stakeholders' number into the marketing chain is generally observed in some remote places and at various time of the commodity erosion (from beginning of economic stress when small companies disappear and economic environment is less favourable but still manageable, but after long stress also big stakeholders can resign from unprofitable activity). The interaction between crop commodity chain and livestock commodity chain patterns should also be elucidated to better capture how one relies on the other.

When dealing with agro-pastoralists and pastoralists food security in the Horn of Africa one can clearly state that foodstuff production (livestock, and crops) is important and is affected by weather stress such as drought becoming a major reason for food insecurity. In addition, one should not forget that access to markets to sell or buy food products produced elsewhere remains the most important topic. It includes those products produced abroad and imported and exchange encompassing animal products and animals locally produced by pastoralists and being sold so that cash is generated and other food product are purchased such as cereals.

One can try to explain the household response to food security stress with the sequence (trajectory) of their reactions in given time and the level of reversible rehabilitation of former characteristics. The following list provides the classic sequence in agro-pastoral areas (Savadogo *et al.*, 1993): adjustment in cropping and livestock rearing; use of famine food (wild food); borrowing grains from extended family; migration of labour force to offer labour supply; sales of small animals; borrowing cash or cereals from merchants; sales of assets (large ruminants); mortgage when admitted in the society based on land or other assets; sale of lands; and permanent migration;

Response from pastoralists to RVF ban has led to use of such sequence markers in their attitude to the new risk. This risk management is at clan or household level, but the up scale environment (livestock commodity sector) also reacts to the economic stress and may offer a very unfavourable environment hampering the classic risk management benefit for pastoralists from their classic resistance sequences.

Since food is also imported to achieve food security in a country any stress on import sector would also influence the level of Food insecurity.

When considering food imports, local cereal production meets only a fraction of the consumption needs for Somalia and Region V of Ethiopia. In Somalia, about 80% of foreign exchange earned from livestock exports is used to import basic food items. The export was just beginning to recover from the previous ban. When compared to other years export of livestock, between

January and September in year 2000, about 1.6 million heads of goat and sheep were exported through Berbera alone compared to approximately 1.23 million heads and 0.73 million heads in the same period of 1999 and 1998 respectively (Focus, 2000). According to Focus (2000), the decrease in imported commodities has already shown an increase in prices (e.g. 10-20% for rice and wheat flour to 50-70% for sugar) due to less available, more expensive dollars and associated inflation.

## **5. Policy Issues and Future Prospects**

Right at this time, some of the Horn countries are free from RVF. One of the requirements to be RVF free country, according to OIE, is if the country has not imported any susceptible animals from a country considered infected with RVF for the past three years. As it is well known, there is animal movement among these neighbouring countries. This was the main cause for both the 1998 and the recent bans imposition on some countries, which haven't been considered as RVF infected yet but associated in a global area at risk. It should be noted that these countries are liable to contract the disease, if not yet, in the future since their animal movement control system is weak. In any case, these countries need to strengthen their veterinary service surveillance system and marketing system in order to early identify the disease or prevent its introduction and to control the disease spread so that it has less consequences, if in case the country declared to be RVF infected in the future. To achieve those objectives specially connected to the new rules of global economy and international regulations, the veterinary service is a key actor since it will be the one collecting, analysing, and delivering epidemiological information, and launching preventive strategies as well. New function such as epidemiosurveillance is key issue as appropriate method for assessment of veterinary services. Not only the results of a surveillance but the means involved into it will be indicators to assess the validity of a given animal health system.

It is obvious that even in developed world veterinary services is playing a more and more important role in providing information for negotiation at international level within the frame of the SPS agreement of WTO. The recent examples of BSE in Europe or the epidemic of FMD in Europe and Argentina are giving evidences of the renewed role for veterinary services. Additionally, the delineation of livestock commodity sector, its shape and its characteristics will enable a good control and implementation of proper health information system or not is not neutral to be the debate. Some of the requirements to build a competent veterinary service are guiding policy, effective administrative structure, effective network and information system, adapting new technologies, adequate budget allocation, trained manpower, intensive research and extension package, which are very nonexistent or weak (Workalemahu, 2000). In case of environmentally sensitive diseases such as RVF, countries can predict the epidemic of such diseases by adopting technologies like Satellite Imaging that provides information on vegetation and other geographical changes, which favours the outbreak.

The livestock marketing system of the Horn nations should be compatible with international requirements in the highly competitive world of today and be effective in disease prevention and control. If we sight Ethiopia as example, recent information on location specific marketing constraints; livestock sources, prices margins; stock marketing routes; how price and margin volatility is affected by other variables such as season, climate variation, crop prices are unknown for any tier of the livestock marketing chain and market information endowments are also not well known (Solomon *et al.*, 2000). There are no permanent animal route and other facilities like water and holding grounds, provision of transport is inadequate or none, inadequate infrastructures and institutional issues, and absent of market information system are also some of the major problems facing this sector (Workalemahu, 2000). Much and recent researches haven't been undertaken to improve the marketing system; besides, there is no guiding policy and market

promotion study. Establishing infrastructures and encouraging the establishment of voluntary farmers co-operatives is advisable to facilitate marketing of commodities, credit availability to smallholders, and information exchange. Animal certificate of origin should be introduced that contribute for control of animal movement. In general, improving the above raised parameters play great role in effective prevention and control of trans-boundary and trans-regional diseases such as RVF and many others that the Horn nations need to upgrade the sector.

International experience to tackle vector-borne emerging diseases may serve to better target our effort so that a common memorandum of understanding would be accepted by all countries having that problem and methodologies are made available to prevent the disease. Among few alternatives Early Warning System (EWS) is known to help predict disease occurrence in certain location. Authors (Kermaak and Mc Hendrick, Ross and Hudson) have predicted times ago the importance of modelling to better predict emergence or spread of diseases so that measure to prevent the spread are taken on time. Applications of mathematical modelling based on various sources of data are now quiet common in SSA and some are dealing with RVF (Fontenille, Linthicum). For example, a consortium of French and Senegalese advanced research institutes S2E (*Surveillance spatiale des Epidémies* i.e. Spatial surveillance of Epidemics) have launched in October 2000 an innovative study on how to monitor and make better epidemiosurveillance of RVF. The project is being implemented in Sénégal using the new concept of “tele-epidemiology” focusing on several public health topics of interest. The study utilises the environmental data made available through satellite observations for meteorological (wind direction) and scientific purpose (animal movements, vegetation index, ocean temperature...) or taken from sentinels’ networks on ground (water levels in ponds, rainfall data...). Geo-referenced data are sent through satellite channels using telecommunication tool-case (using telecommunications satellites and therefore taking into account the scarcity of ground telecommunications in SSA). Data collection and data entry scheme is giving inputs to mathematical models specific to one disease (RVF in that case) to better understand and predict spread of the vector-borne disease and the study seems promising. Crossing ecological climatic and epidemiological (clinical, serological in human and animals) data will help modelling interactions and disease spread and to properly implement prevention measures on time, and predict status of large area with a given probability.

## 6. Conclusions

The current export ban in mid-September 2000 on livestock from Horn countries has threatened the livelihood of pastoralists in particular and the economy of Horn countries in general. The crisis may not be mitigated by emergency food aid and domestic agricultural production in such areas where rainfall is erratic and unreliable. With regard to Food security concept and the role of Livestock to improve it one should debate at various levels.

Food security can be assessed at **various scales of an economy** leading to build indicators at each level of investigation, national and **regional** scale, **household level** (insecurity is when supply is less than demand forcing state and donors to commit themselves into re-equilibrating the supply demand balance, when indirectly influencing market mechanisms or with direct public intervention) and at **individual** level (when for some reasons among the households, arbitration to food consumption is given so that some households members only get the sufficient diet they need , and consequently when some individual food consumption is less than needs forcing direct intervention to nutritional and normal diet rehabilitation programmes).

Livestock is providing inputs at all levels of the economic puzzle and helps pastoralists and agro-pastoralists to cope with food provision stress. In some occasion nevertheless when Livestock sector cannot play its role , Food security is severely affected and some intervention should be asked.

All these factors explain the recourse to state and donors' intervention (food and feed aid) and as well the crucial stake of sustainable development in some regions. Some other debatable theories will base the concept of food security not on local self-sufficiency but on exchanges of products made available through globalisation of markets and internationalisation of food products trade. When dealing with livestock in particular WTO and OIE regulations may hamper the global trade offering barriers to the market through sanitary barriers (RVF ban) and as such stressing the food security mechanisms.

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