

Disaster risk reduction in the livestock sector: the Costa Rican experience

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Summary

As Costa Rica forms part of Central America, it is highly vulnerable to disasters. These tend to have a bigger impact in rural areas, where they cause considerable damage and losses to agricultural production systems. Animal production is strategically important for the country, a dominant activity in rural areas and an important source of employment. It is also one of the types of farming most affected by disasters. Disasters impact animals directly, damage the livestock infrastructure and increase the risk of disease. They can also affect the country's health status, undermine food security and result in farmers losing their livelihood, with cumulative impacts that can weaken the economy over time.

The earthquake that destroyed the town of Cinchona, in the province of Alajuela, in January 2009, caused fatalities and left entire communities devastated. Losses in the agricultural sector totaled USD 10,996,647, nearly USD 2 million of which were in the livestock sector, with almost half a million production animals affected. On the other hand, hydrometeorological events trigger floods and droughts whose impact on the livestock sector include higher cattle mortality, limited fodder availability, lower rates of productivity and higher input prices (Diaz, Trelles and Murillo, 2015).

For those reasons, Costa Rica's Ministry of Agriculture and Livestock, through the National Animal Health Service (SENASA) and the National Commission for Risk Prevention and Emergency Response (CNE), working with other public and private stakeholders and supported by international agencies, has implemented a series of actions aimed at strengthening governance, building capacity and promoting prevention for disaster risk reduction in the livestock sector, making it more resilient to both epidemic and non-epidemic emergencies.

These actions move away from and seek to transform traditional approaches to disaster risk management at the global level; they also require that all stakeholders involved adopt innovative actions and self-learning processes. The current context demonstrates that it is urgent and crucial to anticipate disaster risks and undertake measures to reduce them. This will allow for better protecting communities, countries and ecosystems, as well as peoples' livelihoods, health, cultural heritage and socio-economic assets, thereby strengthening their resilience.

Costa Rica's experience underscores the need for coordination and for responsibilities to be shared among the sectors in order to achieve more effective disaster risk reduction. It also highlights the importance of focusing disaster risk management not only on the protection of human life, but also on farmers' livelihoods and productive assets such

as livestock, as established in the Sendai Framework. The country's experience has also enabled SENASA to achieve more efficient health risk management, making it a unique case in the Central American region and quite rare in Latin America.

This experience provides conceptual and methodological contributions to facilitate a paradigm shift in the veterinary services of countries, to broaden their vision of risk management. Society now faces global hazards and catastrophic events that surpass the relief capacity of conventional or sectoral spheres. In a context of sustainable development, an adequate response calls for a comprehensive, holistic approach.

Given the innovative quality of its modus operandi, which is helping to build and strengthen the resilience of Costa Rica's livestock sector, World Animal Protection and the Inter-American Institute for Cooperation on Agriculture (IICA) have considered it a valuable experience worth sharing and bringing to the attention of the international community in various forums. Such was the case of the VI Regional Platform for Disaster Risk Reduction in the Americas, which took place in June 2018.¹ A side event was held to orient other countries seeking to reduce the risk of disasters and increase resilience in the livestock sector.

¹ <http://eird.org/pr18/>

1. Introduction

Every year, millions of people who depend on agricultural production, particularly in rural areas, are exposed to adverse phenomena such as droughts, floods, hurricanes, landslides, earthquakes and epidemic outbreaks, which can become disasters. Such emergencies may occur suddenly or develop slowly, be isolated events or trigger additional ones, or be a combination of both. They may lead to deaths and injuries, harm health and damage property, destroy livelihoods, weaken services, produce social and economic upheaval and cause serious damage to the environment (Diaz, Trelles and Murillo, 2015).

Nearly one billion of the world's most impoverished inhabitants depend on the livestock sector for their livelihoods and are likely to continue to do so in the decades ahead. Thus, animal production is vital as a livelihood for the poor. Livestock make up an integral part of agricultural systems, helping to raise farm productivity and provide a continuous stream of food and income for households (FAO, 2009).

In the rural areas of most countries, people and animals tend to live in close proximity. Animals are a source of food and nutrition, are used for work on the farm and for transportation, and also serve as a storehouse of wealth, a guarantee to secure loans, and a safety net in times of crisis. Livestock assets are valuable, and their loss usually places producers—especially family farmers— at greater risk.

Costa Rica is a country that is exposed to countless hazards due to its location and geological structure. Most emergencies are associated with extreme hydrometeorological events such as heavy rainfall, flooding and landslides, but also with extremely dry scenarios. Earthquakes and volcanic eruptions are also a constant threat.

The year in which natural phenomena had the most serious economic impact was 2009, when losses reached USD 447.35 million (1.77% of GDP). The main contributing factor was the earthquake in Cinchona, in Alajuela Province, which produced losses of USD 419.37 million, 92.43% of which (USD 387.63 million) occurred in rural areas (MIDEPLAN-MAG, 2013).

Given the country's vulnerability and the impact on the livestock sector, Costa Rica has strengthened its governance for disaster risk management by incorporating disaster risk reduction into the livestock sector, a process that has taken a number of years. Within this framework, efforts have focused on the development of coordination mechanisms and public policy frameworks, financing initiatives and training and sensitization processes, among others, designed to improve the resilience of this strategic sector.

The CNE created the Technical Advisory Committee on Animal Protection in Risk Management (CATPAD) and incorporated livelihood protection into the National Risk Management Policy (2016-2030) and the National Risk Management Plan, which orient the actions of all the country's social stakeholders with regard to risk management.

At the sectoral level, SENASA, the governmental veterinary service, has incorporated disaster risk management into its activities, adopting an approach based on multiple hazards, broadening its response to non-epidemic disasters to help protect livelihoods and prevent the impact on animal health, veterinary public health and animal welfare. To that end, SENASA, working with the CNE, has undertaken efforts to improve prevention and response capacities, train field staff in impact analysis and the needs of animals in the wake of disasters, set up an emergency fund, prepare emergency plans for the livestock sector and develop operational protocols.

A departure from traditional health risk management, actions of this kind lead to more effective protection of animal health, public health and animal welfare, and also help reduce disaster risk and strengthen the resilience of the livestock sector.

2. The context of risk in Costa Rica's livestock sector

The fact that Costa Rica is situated in an intertropical zone means that it is a country rich in biodiversity, with very high rainfall. Considered young in geological terms, it is characterized by great tectonic and volcanic activity and plains and mountains, and straddles two oceans. All these elements are a permanent source of hazards. The conditions of the region in which the country is located mean that the meteorological events that occur periodically cause variations in the amount and intensity of rainfall and affect tides and winds. Such events are associated with tropical cyclones and low-pressure phenomena in the Caribbean, the Intertropical Convergence Zone, cold fronts, easterly waves and the periods of El Niño and La Niña. Most emergencies are associated with events generated by rain and wind; floods, landslides, tidal waves and flash floods may occur at any time of the year. Earthquakes and volcanic eruptions have occurred throughout the country's history (CNE, 2015).

Animal production is a strategically important activity for Costa Rica, in both economic and social terms. The country has 93,017 farms, spread across 47.1% of the national territory. Some 28.5% of farms are given over primarily to cattle production. Beef cattle make up 42.1% of the country's herds, mainly in the province of Guanacaste (INEC, 2015), the region where droughts are most frequent, last the longest and have the most serious

impact. The agriculture sector accounts for 10.3% of the domestic economy (primary sector 5.1% and agribusiness 5.2%) (SEPSA, 2018).

The country has maintained its animal health status by controlling and monitoring pests and diseases that affect animal production and human health. The fact that the country is free from foot-and-mouth disease without vaccination means that it enjoys access to meat and dairy product markets. In 2016, the World Organization for Animal Health (OIE) recognized Costa Rica as having a negligible risk for bovine spongiform encephalopathy, enabling the country to export beef products and live animals to markets such as the European Union and the United States of America. The country was also declared free from classical swine fever. Efforts are being made to reduce the prevalence of brucellosis, with a view to achieving the sanitary status of disease-free areas.

Given the livestock sector's importance to the country, epidemic or non-epidemic emergencies could result in huge economic losses, as well as food and nutrition insecurity. Without comprehensive management, the damage to society could be much greater still.

Non-epidemic disasters can create the ideal conditions for the emergence and spread of new diseases, or increase the incidence of existing ones, given the fragile state of the survivors and conditions conducive to the spread of pathogens, an increase in vectors, and other consequences of the event. Floods, for example, may impact animals in various ways: moisture and the concentration of contaminated water foster diseases such as leptospirosis. During times of drought, there may be outbreaks of anthracnose and other infectious diseases, or diarrhea may become more prevalent. Moreover, if access to water becomes a problem, domestic and wild animals may be obliged to drink from the same source, something that does not occur under normal climatological conditions. In such cases, the former may acquire infectious agents from the latter, encouraging the appearance of emerging diseases. If zoonotic agents are involved, public health may be put at risk (Diaz, Trelles and Murillo, 2015). Table 1 shows some of the animal diseases associated with non-epidemic disasters.

Between 2005 and 2011, 16 intense events associated with hydrometeorological and geotectonic phenomena occurred in the country, resulting in estimated losses of USD 1130.39 million (USD 1.13 billion) in constant 2011 US dollars. In terms of the impact on the various sectors, the road infrastructure was the hardest hit, followed by the electricity generation system, agriculture and housing—four vital underpinnings for the country's development. Furthermore, estimates of the potential economic and social losses made in different studies carried out in the country suggest that, if the risk of disasters continues to grow, Costa Rica will not be able to cope with

the losses incurred. Hence, the need for government institutions, the private sector and society to address these challenges with a long-term vision (CNE 2015).

Table 1. Some diseases associated with non-epidemic emergencies or disasters

Diseases	Description	Non-epidemic disaster
Vector-borne diseases	Arbovirus encephalitis, due to an increase in vector populations.	Floods, hurricanes, droughts, prolonged summers
Avian diseases	Newcastle disease, bird flu. Due to changes in the migration patterns of wild birds, greater contact between wild and domestic birds.	Floods
Clostridial diseases	Blackleg, botulism, tetanus, others. Caused by contamination of stagnant water and fodder with spores.	Floods
Anthrax	Highly contagious for animals and humans. Prevented by proper disposal of carcasses.	Droughts and prolonged summers
Salmonella	Resulting from consumption of contaminated water or food that comes into contact with contaminated water.	Floods
Leptospirosis	Acquired from stagnant water, consumption of food contaminated with the urine of infected animals.	Floods
Parasitosis	Immunosuppression may make animals susceptible to subclinical parasitoses.	Floods
Urinary tract infections	Cases reported in pets.	Floods, hurricanes
Mastitis	When dairy cows are not milked, can become infectious.	Earthquakes, landslides

Diarrheas	From stress, consumption of waste water, etc.	Floods, droughts
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Source: Diaz, Trelles and Murillo, 2015.

Current estimates only consider the direct losses associated with events. The economic impact of disasters could be greater than estimated if the indirect impact is included, given the importance of animals in rural areas. Table 2 shows a summary of the direct and indirect losses stemming from the loss of production animals in a disaster.

Table 2. Direct and indirect losses in the livestock sector

Direct losses	Indirect losses
<ul style="list-style-type: none"> • Dead, sick and missing animals • Lost production of meat, milk and other byproducts • Damage and loss of livestock infrastructure • Damage and loss of machinery and equipment • Loss of savings and investment • Loss of inputs: fodder, feed, drugs, others. • Cultivated areas affected • Loss of products and byproducts due to interruption of transportation or the cold chain 	<ul style="list-style-type: none"> • Reduction in the income of producers and other stakeholders in the value chain • Fewer opportunities for loans • Loss of security in times of crisis • Higher prices • Impact on human and animal health • Loss of food security • Impact on nutrition • Unemployment • Environmental damage

Source: IICA, World Animal Protection and CEPREDENAC, 2018.

3. Governance of disaster risk management in the livestock sector

The institutional framework for disaster risk management in the livestock sector has evolved over time, reflecting national and international commitments and the leadership of the institutions involved. Disaster risk governance is of great importance for an effective and efficient management of disaster risk.

Created in 1969 and subsequently restructured to meet the nation's needs, in 2006 the CNE was assigned responsibility for risk prevention and emergency preparedness under Law No. 8488. The CNE also coordinates the activities of the National Risk Management System (SNGR) and implementation of the SNGR's National Plan.

Given the importance of the management of animals in disasters, in 2015 the CNE set up CATPAD to provide the CNE and the bodies that make up the SNGR with technical assistance, in its capacity as an interinstitutional entity. CATPAD is comprised of different institutions in the public and academic sectors, as well as professional associations and international organizations. The CNE chairs CATPAD and coordinates its actions directly. SENASA participates in CATPAD, given the role it plays in animal care when disasters occur in the country.

The 2016-2030 National Risk Management Policy, approved in 2015, is the planning instrument with a long-term vision for disaster risk reduction. Under this policy, Costa Rica is putting into practice at the national level the commitments adopted internationally in the Sendai Framework for Disaster Risk Reduction (2015-2030). The national policy also integrates the efforts of the CNE and SENASA with regard to animal care in disasters. The 2016-2020 National Risk Management Plan is the strategic planning instrument for the first five years of the policy, establishing actions, goals and responsibilities. Thus, the CNE's role in the public sector is consistent with the international context and reflects the spirit of the Central American Comprehensive Risk Management Policy.

SENASA has been the country's governmental veterinary service since the 1970s, evolving and adapting to Costa Rica's animal health and veterinary public health needs. In 2006, the National Animal Health Service Act (General Law No. 8495) established SENASA as a decentralized agency with the appropriate legal status, operating under the aegis of the Ministry of Agriculture. The same act established the legal basis for the declaration of emergencies and created a cumulative fund to be used exclusively for dealing with emergencies. SENASA's emergency response activities were thus designed to be carried out recognizing the possible economic, environmental, social and health-related impact that many animal diseases, especially zoonoses, could have on the country (Diaz, Trelles and Murillo, 2015).

With this in mind, in 2009 SENASA created the National Program for Animal Management in Disasters, and since then has been strengthening its capacity to prevent and respond to disasters that affect the country's animal population, public health and the economy, taking into account the principles of governance of disaster risk management in the country.

In creating this program, Costa Rica became one of the first countries in the region to assign such a role to a government veterinary service. The program is tasked with ensuring the continuity of Costa Ricans' way of life and

livelihoods, and the survival of their farm animals and pets in emergencies or disasters. Under the program, SENASA participates in the work of the national, regional and local disaster risk management entities coordinated with the CNE. As part of the Ministry of Agriculture, SENASA also forms part of the Health and Production clusters of the National System of Civil Defense. Figure 1 shows SENASA's framework of action for disaster risk management.

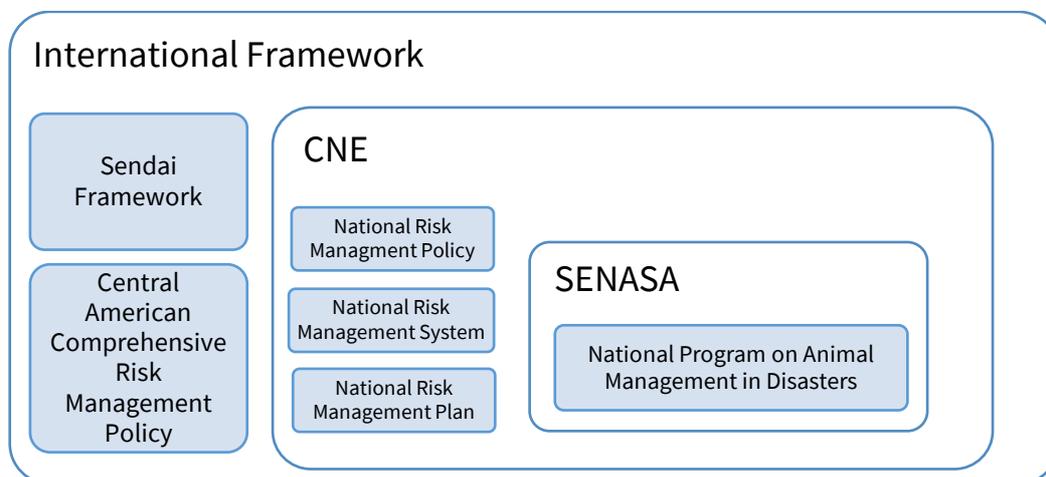


Figure 1. Framework for Action by SENASA in Disaster Risk Management

Source: Diaz, Trelles, and Murillo, 2015.

4. Capacity building for animal care in disasters

Through the National Program on Animal Management in Disasters, SENASA has implemented a series of mechanisms for animal care during disasters. These include the creation of new management and planning capacities and emergency response tools, the implementation of an emergency fund and promoting a culture of prevention.

a) Creation of new capacities

Training was directed mainly at SENASA technicians and focused on basic aspects of disaster management, the Incident Command System, LEGS (Livestock Emergency Guidelines and Standards), damage assessment, planning of interventions and implementation of assistance operations. Support for this task was provided by the National University of Costa Rica and World Animal Protection.



Figure 2. LEGS training. Photo SENASA.

b) Creation and application of new tools:

- Vulnerability and impact maps

SENASA makes use of its Information System for Registration of Livestock Establishments (SIREA, Spanish acronym) to estimate the vulnerability of farms and animals in an emergency. SIREA is a web platform that centralizes information about livestock establishments (farms) and makes it possible to visualize, capture, maintain and analyze geographical data, and interact with maps and images. This information facilitates decision making during emergencies, the planning of support logistics (feed, medical care, evacuation, etc.) and the estimation of possible damage and losses. Once in the field, information from the vulnerability maps is verified, impact maps are prepared and actual damages and losses are estimated.

A database of geo-referenced farms is currently included in SENASA's Rapid Response Procedures, which allows for collecting early-impact information for quick decision making. In this way, each situation can be assessed quickly and assistance can be provided to affected farms within the first 24-48 hours, depending on the circumstances.

The figure below shows the impact map for the emergency caused by the Turrialba Volcano in 2016. It also provides data on farms in the affected areas.

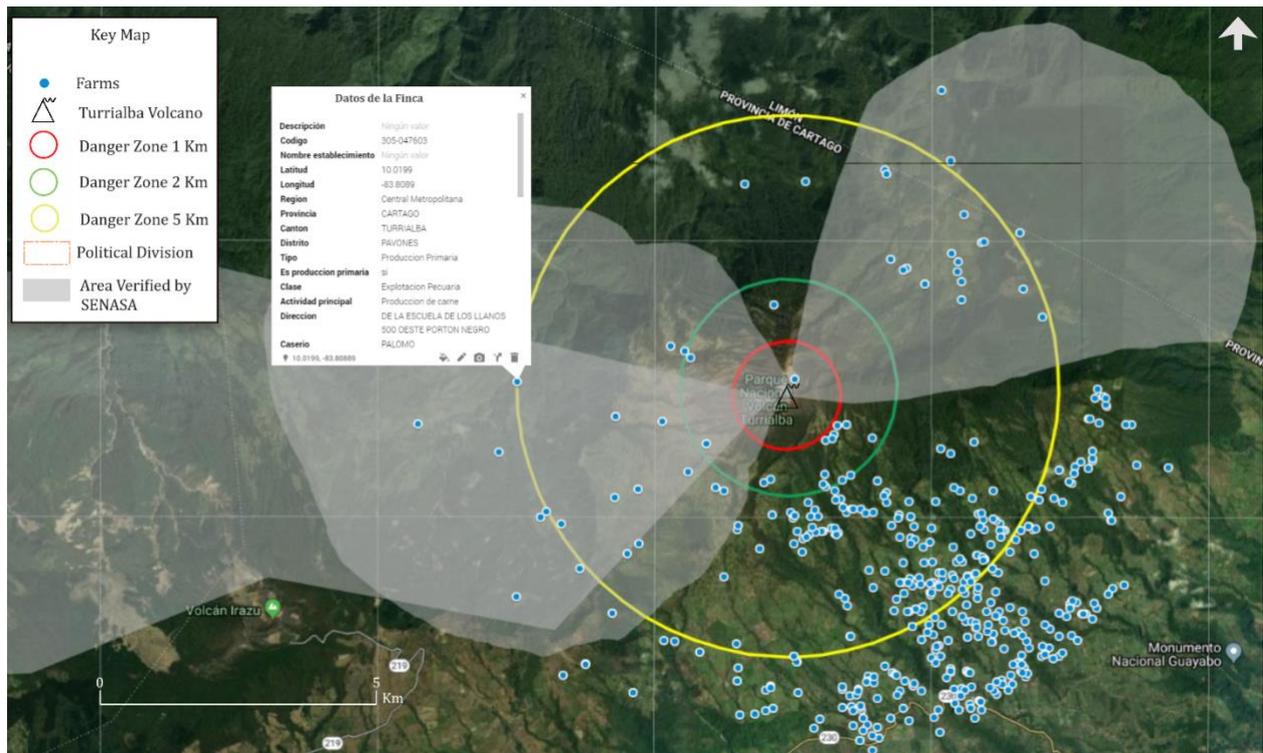


Figure 3. Impact map for area affected by ash from the Turrialba Volcano

Source: SENASA

- Emergency plans and simulations

SENASA supports the preparation of emergency plans at the local level, in order to provide more efficient support to livestock producers and their communities. It also carries out epidemic simulations that contemplate non-epidemic threats to ensure adequate preparation for emergency response.

Authorities have implemented Early Warning Systems, which, complemented by producers' built-in capacities, have allowed for defining four Risk Reduction Plans in highly vulnerable communities.

- Financing mechanism for emergencies

A Sinking Fund for Health Emergencies was established in 2013. The fund includes resources from SENASA's regular budget, as well as from loans, donations, allocations, fines and any other legal source of financing established for this purpose. Ordinarily, up to 10% of the total income generated from the sale of SENASA's services is transferred to this fund monthly. The fund provides resources for SENASA to act both in epidemic and non-epidemic emergencies.

In the same year, SENASA conducted a simulation to test out the use of the emergency fund, which revealed areas for improvement, such as swifter procedures to activate the Fund and utilize its resources, and more streamlined mechanisms for intra- and inter-institutional linkages.

In 20015, SENASA activated the emergency fund for the first time and implemented the emergency response procedures that had been established, in order to respond effectively to the needs of various stakeholders who had been affected by either lack of rain or intense precipitation caused by El Niño. Overall, compared to the administrative processes followed in regular situations, the fund allowed for utilizing resources more quickly. Different ways to perfect the financing mechanism were also identified. It is worth noting that emergency response had previously been funded using resources programmed for other activities. Thanks to the Fund's existence, SENASA now allocates resources specifically for this purpose.

A revolving Emergency Fund for Animals in Epidemic and Non-Epidemic Emergencies, containing approximately USD \$600,000.00, is currently in place.

d) Promoting a culture of prevention

With support from IICA, SENASA is in the process of updating its manuals on Good Agricultural Practices, based on a comprehensive risk management approach that contemplates different types of risks, both epidemic and non-epidemic.

Bovine and swine production manuals have been reviewed and updated together with the public and private sectors. In this regard, Costa Rica is also supporting the development of regional regulations for Central America pertaining to good practices for the production of cow milk.

e) Raising public awareness

To consolidate the role of owners (of companion and producer animals), as the first line of response in a disaster, SENASA and World Animal Protection launched awareness campaigns directed at animal owners, both in urban and rural areas.

f) Training for producers

SENASA has included aspects of animal management in disasters in the training activities that the operational regions regularly provide for producers.

g) Public-private partnerships

SENASA engages in comprehensive coordination and joint work with the National Associations that represent the livestock subsectors, academia, and civil society organizations.

The national Development Banking System and the National Insurance Institute (INS) have also become involved in the process, through the identification and management of risk factors in order to propose best practices for the agricultural/husbandry sector.

5. Agenda for disaster risk management in the livestock sector

SENASA has specific responsibilities in the context of the 2016-2020 National Risk Management Plan, in the areas of: (1) Risk Reduction, (2) Preparedness and Response and (3) Recovery. Strategic actions are implemented and monitored taking into account the defined goals and indicators. The 2016-2020 National Risk Management Plan is an instrument of strategic focus to guide all actors at the national level, in compliance with the 2016-2030 National Risk Management Policy. The main activities carried out are:

- Animal Management Plan for the livestock sector
- SIREA compatible with the Emergency Information System
- Inclusion of risk management criteria in SENASA's Veterinary Certification of Operation
- Implementation of an exchange program to promote good livestock and production practices related to risk reduction in animals
- Compilation of animal health regulations related to disasters
- Guidelines applicable to operating permits for agricultural production systems, which include risk analysis and mitigation measures
- Baseline on animal welfare as part of vulnerability studies for livestock and companion animals (pets)
- Preparation of a manual on animal management during disasters

These strategic actions will contribute to the achievement of the outcomes of the National Risk Management Policy 2016-2030, in compliance with the Sendai Framework.

It is evident from the above that SENASA's work is not limited to animal rescue and care in a disaster. Employing a much broader vision, it also aims to strengthen the resilience of the livestock sector through prevention and risk reduction efforts.

This dynamic process still calls for the establishment and implementation of innovative mechanisms to reduce the risk of disasters in the livestock sector. Currently the World Organization for Animal Health (OIE), a global reference organization in the area of animal health, has established standards and guidelines for animal care in epidemic emergencies or disasters, but guidelines are still needed specifically for animal care in the event of non-epidemic disasters.

6. Economic losses and investments in animal care in disasters

Including disaster risk management in the Official Veterinary Service helps to reduce the risk that accompanies disasters in the country and furthers SENASA's objectives of protecting animal health, veterinary public health, and animal welfare, by addressing multiple threats, thereby increasing the resilience of the livestock sector.

Table 3 shows the estimated direct losses in emergencies (epidemic and non-epidemic) for the period 2014-2018. It also indicates the amounts that CNE and SENASA have invested to address first impact requirements and for the reactivation of production. Most of these resources come from the CNE and SENASA emergency funds, as well as from SENASA's regular funds, and include donations received from civil society.

SENASA's investments are primarily geared toward animal health, while CNE investments focus on reactivation of production. Table 3 also shows the immediate benefits to the livestock sector of a timely response to disasters. While SENASA has incorporated disaster risk management into its work, the CNE participated in efforts to address an epidemic emergency - an outbreak of Newcastle disease - a process that also benefited from the active involvement of the private sector through the National Poultry Association.

The outbreak of Newcastle disease, which prompted the declaration of an epidemic emergency, was associated with the drought. As a result of joint efforts, the spread of the disease was halted, preventing negative impacts on national poultry production (more than 18 million birds in 36,752 poultry farms, according to the National Census), which would have affected national consumption and exports.

Table 3. Economic losses and investments in animal care in disasters, 2014 – 2018 (USD)

Emergency	Animals affected	Estimated losses	Investments	Immediate benefits
Drought. 2014	Cattle, pigs, horses and poultry	19,399,503	6,141,879	<ul style="list-style-type: none"> - Protection of livelihoods - Basis for restarting production - Food security based on own resources
Drought and storms in the Caribbean region. 2015	Cattle, pigs, horses and poultry	6,239	1,053,526	<ul style="list-style-type: none"> - Prevention of diseases - Reduction of mortality - Food security

Newcastle disease. 2015	Poultry	264,497	1,524,206	- Rapid containment of outbreak - Protection of livelihoods - Food security
Turrialba Volcano. 2016	Cattle	1,761,605	1,099,424	- Prevention of diseases - Reduction of mortality - Protection of livelihoods - Food security
Hurricane Otto 2016	Cattle, horses, pigs, poultry, sheep	46,580,305	10,121,799	- Prevention of diseases - Reduction of mortality - Protection of livelihoods - Food security
Tropical Storm Nate. 2017	Cattle, horses, pigs, birds, goats, buffalo, trout and tilapia	11,042,842	2,873,593	- Prevention of diseases - Reduction of mortality - Protection of livelihoods - Food security

Source: Prepared by authors with data from the SENASA Management Report, 2018.

7. Lessons learned

This section addresses the lessons learned from Costa Rica's experience, which have been gleaned from discussions and meetings with the protagonists. These lessons have been systematized for their further improvement and also to serve as input for similar processes. In light of the progress achieved since the date of its publication in 2015, this analysis has been complemented by the National Program for Animal Management in Disasters and IICA.

a) The institutional framework for addressing disaster risks adopts a modern vision that recognizes the importance of prevention and inter-sectoral work in animal care during disasters.

The National Commission on Risk Management and Emergency Response (CNE) has adopted a comprehensive vision of disaster risk management, as established in the international framework and, in particular, in the Sendai Framework. It therefore exercises a permanent supervisory role, ensuring that the State agencies and entities of each sector include risk management criteria in their planning and implementation of plans, programs and projects that promote national development.

b) Vision of sustainable improvement in the Official Veterinary Service

SENASA pursues a process of continuous improvement, sets priorities and implements initiatives, based on a strategic plan. In accordance with this, its performance is continuously evaluated according to OIE international standards, national guidelines and internal control regulations. This strengthens essential aspects of its mission as a veterinary service.

Based on the opportunities for improvement identified in health emergency response and disaster risk management, SENASA has strengthened its mode of action in emergency animal care by adopting a vision focusing on the prevention and reduction of health risks.

c) Modern regulatory framework to address current and future challenges and opportunities in animal health and veterinary public health.

The SENASA law reflects the requirements established in international standards in order to ensure good governance of veterinary services. This law laid the foundation for general rules to address emergencies swiftly and expeditiously. In this context, SENASA created a sinking fund for emergencies, both epidemic and non-epidemic, and has made progress in disaster risk management.

d) Inclusion of disaster risk management in the Official Veterinary Service

SENASA created the National Program for Animal Management in Disasters, which is responsible for specifying and structuring animal care procedures in non-epidemic emergencies, and interacts with the CNE as part of the National Risk Management System (SNGR).

e) Adoption of the international framework furthers the process of institutional modernization and transformation in risk management

The rapid adoption of international guidelines on disaster management has set the pace at which attention to this issue has evolved in the country, at the level of both the CNE and SENASA. This change enables comprehensive protection of the country's health status, with the aim of achieving sustainable agriculture, based on prevention, an attitude that will undoubtedly contribute to the country's development.

f) Strategic actions under SENASA's responsibility in the 2016-2020 National Risk Management Plan

The Plan provides a binding framework for SENASA's actions and those of other sectors, with defined goals and indicators.

g) Development of new tools and their linkages with existing tools

Along with computer systems, databases and geographic information systems (GIS) have provided SENASA with critical tools that enable it to make rapid and effective decisions for disaster risk management in the livestock sector.

h) Awareness and capacity building for institutional transformation and modernization

Awareness and training processes are the mainstays for effecting changes in animal management during disasters in the country.

These are inductive processes that recognize changes that are occurring in the international context, assess emerging issues, and take into account aspects of ownership and the progressive development of capacities.

i) Collective action of institutions in risk management

Collective action strengthens the work of the National Risk Management System, since its experience is complemented by the resources and technical capacities of other sectors. This is vital when implementing a national strategy, especially given the magnitude of the hazards to which the country is exposed.

The participation of the private sector and organized civil society is thus a key element in strengthening the National Risk Management System.

j) Leadership as a driver of institutional transformation and modernization

The transformation that has taken place in disaster risk management and that has led to the inclusion of animals has been driven by the leaders of participating organizations.

k) The role of international cooperation

Support was provided to SENASA through cooperation and capacity building, not only in emergency response *per se*, but also in the preparedness and prevention phases, and currently in the adoption of good livestock practices.

8. Challenges and opportunities for improvement

Costa Rica's experience in risk management and animal care in disasters underscores the importance of comprehensive management of health hazards for effective disease control, regardless of whether the risks are epidemic or non-epidemic. This process, which has been evolving over the years, now includes animal management and promotes prevention, risk reduction and the protection of livelihoods, in order to strengthen the resilience of the livestock sector.

Now that SENASA has a more active role in the National Risk Management System and a broader vision of health risk management, it has a greater opportunity to protect animal health, public health and animal welfare, as essential components of its mission, and to contribute more effectively to the country's development.

When analyzing the experience, however, the protagonists identified the following opportunities for improvement and for the sustainability and consolidation of the achievements obtained thus far:

a) Ensure that the National Program for Animal Management in Disasters has the required technical and operational capacities to periodically update the emergency plan and disseminate it through training programs and simulation exercises. Updates to the Program must also reflect changes in the international framework for disaster risk management.

b) Strengthen the financing mechanism with procedures that enable a more rapid use of resources.

c) Provide continuous training for technical and administrative staff, and constantly review and update technical and administrative emergency response procedures to ensure comprehensive risk management by SENASA.

d) Ensure SENASA's active participation in the Technical Advisory Committee (CATPAD) and coordination of its actions with the national disaster risk management framework.

e) Strengthen work with the private sector and with communities so that animals are also included in family emergency plans, thereby generating civic co-responsibility in emergency response.

f) Promote community training by applying differentiated strategies that ensure the equitable participation of both men and women. Disaster risk management is everyone's responsibility: communities, the public sector and the private sector.

g) Maintain a database in the National Program for Animal Management in Disasters that includes information on declared emergencies, minor emergencies, damage and losses, resources invested, etc. so that studies can be carried out to assess the impact of emergencies (direct and indirect), the benefits of the measures adopted, and effectiveness in the use of the Fund, among other aspects. Such information supports planning, decision making and the presentation of arguments in the policy sphere.

h) Official use of a single instrument for capturing information, with access provided to all regional offices for its continuous management.

i) Establish a computer-based methodology for estimating losses and gathering data in the field, in order to generate timely information and improve decision making for the resumption of livestock activities after a disaster, in the shortest time possible.

j) Encourage alliances with international cooperation agencies and academia to address training needs in animal management and risk management, and evaluate mechanisms to take advantage of the capacities of veterinary professionals with experience in risk management.

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