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REPORT

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Veterinary response to non-epidemic disasters: the experience of the Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" after the 2009 earthquake in L'Aquila, Italy

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ABSTRACT

Event history: A moment magnitude 6.3 earthquake struck Central Italy on 6 April 2009, causing widespread damage to the city of L'Aquila and nearby villages in the Abruzzo region, affecting the resident population and their livestock and companion animals. Approximately 67,000 people were forced to leave their homes, in many cases with their animals, around 40,000 of whom were temporarily housed in tent camps.

Response: A veterinary crisis unit (Veterinary Action), coordinated by the Director of the Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "Giuseppe Caporale" (Teramo, Italy), Operational Structure of the National Civil Protection Service, was immediately activated to restore and strengthen the local capacity to manage animal health and welfare issues, protect public health and mitigate food safety risks in the affected area. A surveillance system was promptly implemented to assess the situation by gathering in-field information, and to identify and address urgent needs, plan and coordinate interventions, and quickly mobilise the necessary resources. Veterinarians and public health operators, private practitioners, volunteers, animal owners and ordinary citizens operated in concert with the Department of Civil Protection to evacuate, secure, treat and assist animals affected by the disaster and to ensure adherence to food safety protocols in the reception areas for displaced people. A dedicated information network facilitated the coordination of various types of responders and the optimal use of material resources and professional services.

Relevance: This article is the result of a multidisciplinary effort to collect, describe and analyse how veterinary public health interventions were planned, organised and carried out to mitigate the impact of the most devastating earthquake in central Italy in the last 40 years. This detailed and comprehensive report provides specific real-life examples and recommendations to plan timely and efficient interventions whilst maintaining the highest standards of animal health, welfare, and food safety in the case of catastrophic events. By capturing insights from those involved, readers will benefit from the knowledge generated and lessons learned to strengthen the capacities of veterinary services to respond to future non-epidemic emergencies.

Abbreviations: DCP: Department of Civil Protection; DI.COMA.C: Directorate of Command and Control; IUVENE: National Reference Centre for Urban Hygiene and Non-Epidemic Emergencies; IIZZSS: Istituti Zooprofilattici Sperimentali; IZSAM: Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale"; LHU/AUSL: Local Health Unit; LVS: Local Veterinary Services; Mw: Moment magnitude; NAS: Carabinieri Command for Health Protection; NCPS: National Civil Protection Service; NGO: Non-governmental organisation; WOAH: World Organisation for Animal Health; VA: "Veterinary Action" crisis unit

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Introduction

Frequent and different hazards of natural origin increasingly impact communities, animals and ecosystems (Vroegindewey *et al*. 2023) at a global level. In 2024, the Emergency Events Database (Delforge *et al*. 2025) of the European Centre for Research on the Epidemiology of Disasters reported 393 catastrophic events, totalling US$241.95 billion of economic losses (CRED 2025). Italy's specific geography makes it more prone to disasters of natural origin than other European countries, with significant consequences for people, animals, historical heritage and economic activities (Anonymous 2024). On 6 April 2009, the strongest earthquake recorded in Italy in the last 40 years struck a vast

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territory around L'Aquila, capital city of the Abruzzo region, killing 309 people and leaving several thousand homeless (Papanikolaou *et al*. 2009). This event also left animals without shelter, food and water, and reduced access to essential veterinary services. Unprecedented challenges for the continuity of livestock production and food safety risks exacerbated the critical situation.

Formed in 1992, the National Civil Protection Service (NCPS) is responsible for coordinating resources and assistance in emergencies in Italy (Dolce *et al*. 2020). The NCPS is organised on a cascading basis ensuring operational consistency from the central government to the local level. It involves national and local (regional and provincial) governmental authorities, municipalities and other public entities (i.e. national fire and rescue service, armed forces, police forces, National Health Service, Italian Red Cross, National Corps of Alpine and Speleological Rescue, the National System for Environmental Protection and the structures responsible for meteorological services). The NCPS also relies on the contribution of professional orders and boards, as well as private companies (i.e. mobility infrastructure operators and essential services suppliers, such as electricity, gas, telecommunications companies) involved in emergency responses, including volunteer groups.

According to the Italian National Health Service, public health responsibilities are shared at the local level between two separate services within the Departments of Prevention of the Local Health Units (LHU/AUSL): the Food Hygiene and Nutrition Service, and Local Veterinary Services (LVS). The latter is responsible for animal health and welfare, food of animal origin, animal breeding, animal production and by-products control. Veterinary Services play a critical role in the disaster management cycle, including relief and assistance to human populations and animals (Holmquist *et al*. 2021) through the implementation of contingency plans, the use of operating procedures, and information dissemination to the population (WOAH 2016). The Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "Giuseppe Caporale" (IZSAM) is one of ten veterinary public health institutes (Istituti Zooprofilattici Sperimentali; IIZZSS) that form a network of public laboratories of the National Health Service. It operates under the authority of the Italian Ministry of Health and the Abruzzo and Molise regions. In the event of non-epidemic emergencies, the IIZZSS contribute as Operational Structures to the supporting Function 02 – "Health, social and veterinary assistance" of the Directorate of Command and Control (DI.COMA.C), and operate under the coordination of the national Department of Civil Protection of the Presidency of the Council of Ministers (DCP) (Migliaccio *et al*. 2018).

The importance of evaluating responses to veterinary emergencies is often overlooked, despite its crucial role in identifying and applying lessons learned to continuously strengthen preparedness and resilience. Examples of after-action reports of hazard-triggered disasters include those relating to Storm Daniel in Thessaly, Greece in 2023 (Meletis at al. 2024); the Nepal earthquake in 2015 (Asokan and Vanitha 2017) and the 2019–20 bush fires in Australia (Cowled *et al*. 2022). The current retrospective analysis reviews the response, best practices, and lessons learned by the IZSAM during the management of events following the L'Aquila earthquake. It assesses the outcomes of veterinary responses and early recovery activities, describes the main criticalities and how they were managed, and suggests improvements for the future.

Event history: the L'Aquila earthquake

On 6 April 2009, at 03:32 hours Central European Summer Time, a moment magnitude (Mw) 6.3 earthquake with a shallow focal depth (10 km) struck the city of L'Aquila (Abruzzo region, Italy) and several neighbouring rural communities. This was the strongest seismic event in Italy since the Irpinia earthquake in 1980 (Mw 6.9), and the first located so close to a large city since the Messina earthquake in 1908 (Mw 7.3) (Galli *et al*. 2010). The seismic sequence began in January 2009, and the earthquake on 6 April 2009 was followed by hundreds of aftershocks, affecting an area approximately 50-km long in a northwest–southeast direction (Chiaraluce *et al*. 2011) (Figure 1). The disaster caused 309 human deaths and > 1,500 injuries (DCP 2019). Over 67,000 people were forced to leave their homes with their animals or leave them behind (Hall *et al*. 2004). Table 1 details the numbers and types of companion animals and livestock affected by the disaster. Approximately 40,000 displaced people found accommodation in designated tent camps (Dolce *et al*. 2020), and 10,000 were housed in hotels in the Abruzzo coastal area. The remaining population found temporary housing solutions in other "reception areas" (i.e. hotels, campsites or private accommodation).

Varying standards of food safety in collective catering (Disanto *et al*. 2021) were a matter of additional concern, along with possible biosecurity risks (e.g. zoonotic disease transmission). Farmers struggled to find veterinary assistance, secure emergency feed and water supplies, and transport, house or destock (sell or slaughter) their animals. The severity and extent of the disaster compromised the ability of veterinary practices to provide essential services (both within normal business hours and after-hours). It also caused personal hardship to the L'Aquila LHU/AUSL personnel, jeopardising the operational capability of the LVS.

Response to the event

Overall management of veterinary activities

On 9 April, after an initial uncoordinated response to the growing demand for veterinary assistance, the

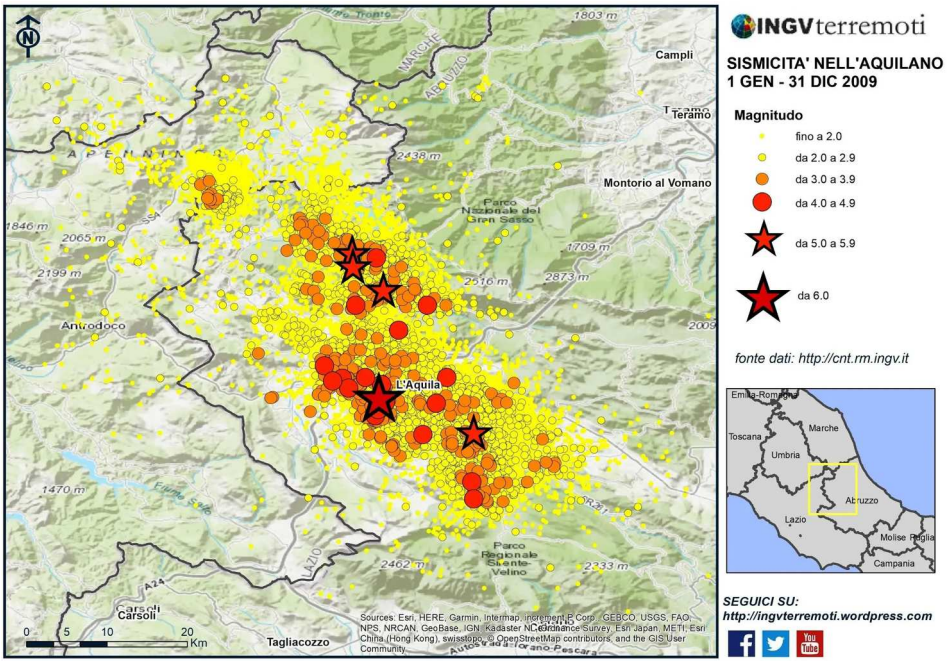

Figure 1. Seismic sequence around L'Aquila (Abruzzo, Italy), from 1 January to 31 December 2009 (source https://ingvterremoti.com/2019/04/05/ricordando-il-terremoto-del-6-aprile-2009-a-laquila/ shared under a CC-BY-ND 4.0 licence). Scale shows magnitude of seismic activity: yellow dot < 2.0; outlined yellow dot 2.0–2.9; orange dot 3.0–3.9; red dot 4.0–4.9, small star 5.0–5.9; large star ≥ 6.0.

Special Commissioner for the emergency appointed the IZSAM Director as coordinator of the veterinary activities to be carried out under the supervision of the Head of the supporting Function 02 of the DI.COMA.C (the national DCP coordination centre set up in the barracks of the Finance Police, a few km from the city centre). A veterinary crisis unit, denominated "Veterinary Action" (VA), comprising

Table 1. Area and inhabitants of municipalities affected by the earthquake in L'Aquila (Abruzzo, Italy) on 6 April 2009, with number of animals present in the region according to the regional and national databases.

				Dogs (N)[c]		Cats (N)[c]			Farm animals (N)[d]			
Municipality	Surface area (km^2)	Inhabitants[a] (N)	MMI[b] (max–min)	Owned	Stray	Owned	Stray	Farms (N)	Sheep	Cattle	Swine	Equids
Acciano	32.34	380	7	93	0	0	0	9	106	1	0	0
Barisciano	78.56	1,788	6.5	227	0	1	0	85	3,910	391	0	0
Castel di Ieri	18.75	355	6.5	31	0	0	0	9	177	15	8	0
Castelvecchio Subequo	19.23	1,141	7	93	0	0	0	35	857	89	0	0
Fagnano Alto	24.45	446	7.5	189	0	3	0	24	207	5	1	2
Fossa	8.63	673	7.5	43	0	0	0	29	49	110	0	0
Goriano Sicoli	21.75	616	7	106	0	0	0	20	835	3	1	0
L'Aquila[e]	466.87	72,812	9.5–6.0	7,822	540	53	124	1,500	17,148	3,945	11	303
Lucoli	109.77	995	7.5–6.5	173	0	0	0	45	1,181	20	0	9
Navelli	42.23	614	7.0–6.0	45	0	2	0	44	1,462	503	2	3
Ocre	23.56	1,063	7.5–6.0	126	0	0	0	28	1,298	302	0	0
Poggio Picenze	11.61	1038	8.5	74	0	0	0	38	499	82	2	4
Prata d'Ansidonia	19.64	525	6.5	82	0	0	0	33	108	81	0	3
San Demetrio ne' Vestini	16.33	1,755	6.5	198	0	0	0	17	9	NR	2	2
San Pio delle Camere	17.26	586	9.5–5.5	105	0	0	0	31	1,008	261	NR	2
Sant Eusanio Forconese	7.97	406	9	67	0	0	0	28	NR	119	NR	NR
Santo Stefano di Sessanio	33.14	120	6.5	13	2	0	0	6	56	NR	NR	7
Tione degli Abruzzi	40.43	343	7	91	1	0	0	28	179	138	NR	NR
Villa Sant'Angelo	5.26	436	9	41	1	0	0	10	190	11	1	NR
Total	979.83	86,182	9.5–6.0	9,619	544	59	124	2,019	29,279	6,076	28	335

[a]STAT Census 2007 (https://www.istat.it/dati/banche-dati/?utm)
[b]Modified Mercalli Intensity scale: measures the intensity of damage at a given location due to an earthquake
[c]Regional database
[d]National database
[e]Two buffalo were also recorded in L'Aquila
NR = not reported

representatives of the Veterinary Service of the Abruzzo Region, the LVS of the L'Aquila LHU/AUSL, the Carabinieri Command for Health Protection (NAS) of Pescara, the Veterinary Board of the Province of L'Aquila, and animal welfare non-governmental organisations (NGO), was promptly implemented by the IZSAM Director (Figure 2).

The IIZZSS network had never been officially involved in non-epidemic emergencies before this event. IZSAM provided voluntary support in the aftermath of the Irpinia and Lucania earthquake in 1980 and had accumulated considerable experience in the management of other veterinary emergencies (Giannico *et al*. 2021; Vitali *et al*. 2021).

Within this system, the DCP is responsible for the preparation and implementation of national plans as well as for coordinating the activities to overcome the emergency phase. However, neither veterinary contingency plans nor operating procedures were in place at that time.

Hence, the VA coordinator was tasked with planning, coordinating, and providing the necessary infrastructure, expertise and assistance to reactivate the veterinary public health system, address animal health and welfare issues and strengthen food safety control measures. An emergency management operational framework comprising of four essential components (knowledge, planning, action and verification) was therefore developed. Specific needs were prioritised through systematic data collection and analysis. Monitoring and assessment of in-field interventions were also organised in a standardised manner.

Priority was given to the definition of intervention areas; the identification of the actions and resources required; the development of a dedicated information management system; and the organisation of logistical support. Communications among operators and the general population were restored and improved.

The VA coordinator established three action areas addressing (1) companion animal health and welfare, with a focus on the temporary accommodations for displaced owners; (2) farm animal health and welfare; and (3) food safety risks related to collective catering for the displaced population. These action areas were coordinated at a central level, ensuring uniformity of intervention and optimising the use of common resources, and services.

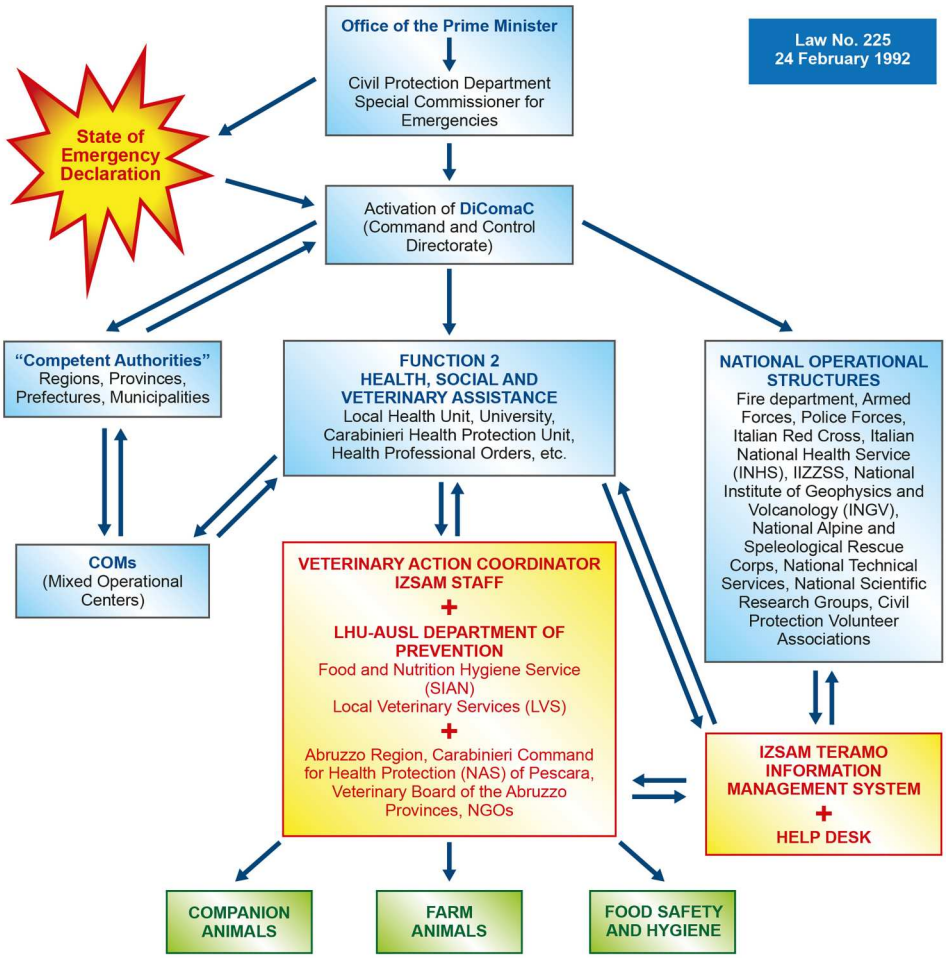

Figure 2. The Veterinary Action integrated system for disaster management and risk reduction, implemented on 9 April 2009, following the earthquake in L'Aquila (Abruzzo, Italy) 3 days earlier, by the director of the Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" as co-ordinator of veterinary activities.

A preliminary assessment of manpower, logistical needs, and existing and required operational tools was done for each action area. The VA coordinator planned specific activities to ensure continuity of veterinary assistance, optimisation of resources and services throughout the emergency phase, until the LVS and private practitioners recovered an adequate level of autonomy. To meet this goal, IZSAM activated an information management system (Possenti *et al.* 2020), structured in four modules dedicated to the management of requests for interventions received by a help desk; livestock and companion animals assistance activities; and directives to ensure food safety in tent camps, temporary housing, and hotels. The first functionalities were available after 48 hours and were updated upon need.

A data collection and transmission system was organised to debrief both the VA coordinator and the Head of Function 02 on a daily basis. The manpower for most of the actions was provided by IZSAM, supplemented by veterinarians from Abruzzo and other regions, the Department of Veterinary Medicine at the University of Teramo, the Regional Breeder Association, the National Fire Brigade, the Abruzzo Region Veterinary Services, the Pescara NAS, the Department of Civil Protection's Volunteer Nurses Coordination for Emergency Health, and several NGO. The LVS of the L'Aquila LHU/AUSL and the regional Boards of Veterinary Practitioners were also involved. Qualified assistance was also offered by private practitioners from other regions and private citizens.

The need for sound, dynamic, logistical support became immediately evident. The presence of personnel, equipment, and vehicles was limited to avoid further congestion in the "crater" area, the central core of rescue and recovery operations (DCP 2016). The main logistical base, including for purchasing and storing goods, was set up at the IZSAM headquarters in Teramo, 40 km from L'Aquila. Two feed distribution hubs were established at the sanitary kennel (a holding facility for the short-term housing of dogs and cats) in L'Aquila, and at the Campo Boario (livestock market facilities) in the nearby village of Onna.

The first objective identified by the VA coordinator was to implement an emergency communication system, with internet-enabled laptops, mobile phones, a fax machine and a photocopier. An information portal and a dedicated email address were also available. DCP communication systems, such as fixed phones and a local area network (LAN), were used to connect five workstations with computers and laser printers.

On 10 April, a 24-hour help desk service was implemented by the IZSAM to handle reports and requests for veterinary interventions in the earthquake-hit area and in the other parts of Abruzzo where families from L'Aquila and their animals were displaced. The help desk operators filtered and forwarded calls to the incident management teams working under the supervision of a veterinarian. Initially, the most frequent calls consisted of notification of missing dogs and cats, reports of free-roaming or abandoned animals, requests for rescue and medical assistance (vaccination, medications), and disposal of spoiled food and carcasses. Offers of assistance, including donations of food for livestock and pets were recorded. Numerous offers to foster animals, including long-distance temporary adoption, were also received. The help desk requests are detailed in Table 2.

Table 2. Reasons for calls (9 April to 2 November 2009) to the 24-hour help desk implemented by Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" following the earthquake in L'Aquila (Abruzzo, Italy) on 6 April 2009.

Reason for call	Number of calls
Sighting/finding roaming animals	271
Availability for animal fostering/adoption	116
Availability for volunteer work	16
Offer of feed or products for animals	19
Monetary donation	14
Request for animal feed	112
Request for animal documents	18
Request for medical intervention/medicines	433
Request for information	131
Request for sheltering of lost animals	80
Organisational issues	9
Total	1,219

Companion animal health and welfare

Companion animal assistance began with the intervention of the IZSAM veterinary ambulance deployed to L'Aquila on the morning of 7 April at the request of the Italian Red Cross.

The Companion Animal Health and Welfare incident management team provided assistance to companion animals both remaining in the earthquake-affected area and those relocated with displaced people, following the *Guidelines for Veterinary Action in Non-Epidemic Emergencies* (Anonymous 1998).

The surveillance system included census and identification of companion animals in the tent camps; preparation and distribution of information to encourage adoptions; rescue, recovery, treatment and reunion of companion animals with their owners; identification and management of animal health and welfare needs; management and distribution of donated materials, medicines and pet food, prevention of zoonoses and fostering optimal human–animal coexistence in the tent camps.

According to Italian law, LVS are responsible for the management of free-roaming dogs, defined as "*any owned or un-owned dog that is without direct human supervision or control, including feral dogs*" (WOAH 2022). Management of dog and cat populations, already complex in ordinary conditions, was further

complicated after the earthquake by the minimal level of compliance with the existing legislative measures. The urban and social disruption also impacted companion animal population dynamics. Abandoned, lost or unattended owned animals started to roam freely, with the risk of becoming feral (Young *et al.* 2011). Moreover, the installation of densely populated tent camps created precarious ecological and sanitary environmental conditions and provided potential sources of food and shelter for free-roaming animals.

The planning of veterinary activities could have been compromised by the lack of reliable information about owned *vs*. "community dogs" and those housed in public, long-term shelters, as the regional dog database did not provide an up-to-date census. According to Abruzzo region legislation, "community dogs" are healthy and inoffensive unowned animals collected on the territory and returned to their place of capture after electronic identification, sterilisation and vaccination. They are allowed to roam free under the responsibility of the mayor of the municipality where they are released. A designated guardian provides them with assistance and essential needs (Berteselli *et al*. 2021). A population of approximately 15,000 owned dogs, 5,000 free-roaming dogs, and 1,500 community dogs had been estimated to be present before the earthquake. This latter sub-population faced additional difficulties regarding their care after losing their customary feeding places. A census of dogs and cats that were owned by displaced people, lost, abandoned, or free-roaming, was therefore a priority.

The first census was performed from 10–18 April in the tent camps by the VA operators and NAS, to determine the size and demographic structure of the dog population and their nutritional, environmental and behavioural needs, identify possible risks for disease transmission, and foster positive human–animal interactions (Glassey 2022). It registered the presence of 1,572 owned dogs, 539 owned cats, 337 free-roaming dogs, and 612 free-roaming cats whose owners could not be traced.

A second census was conducted from 19 May to 20 August in 142 tent camps hosting 29,863 people, using a dedicated questionnaire that assessed conditions and issues relating to animal management more widely (Supplementary Information 1). This census recorded 477 dogs, 84 cats, and 47 animals of other species. A lack of solutions to house animals was the most frequent problem encountered (68.3% of inspected tent camps), leading to dedicated facilities being acquired. Despite the subsequent availability of kennels separated from human accommodation, many owners preferred their animals to live with them, even if the available spaces were restricted. The absence of a manager responsible for animal matters was noted in 66.2% of inspected tent camps. The absence of a single, adequately trained contact person and the lack of specific operating procedures were the main factors limiting the efficiency of veterinary assistance. In addition, there was no consistency between the camp managers, who were periodically rotated and often took contradictory positions regarding the presence of animals. Information on best practices for animal housing in the tent camps was found to be displayed in only 54.2% of inspected tent camps; posters were printed and affixed to compensate for this deficiency.

Human–animal coexistence in temporary accommodations could be stressful and proved to be a critical factor (Ciottone 2024) due to environmental and management issues, including restriction of movement and social isolation (Gunter 2019). However, 83.9% of dog owners had agreed with the other residents to keep their animals with them. A significant number of free-roaming cats (38.7%) and dogs (38%) were identified and registered, confirming the presence of a consistent free-roaming population prior to the earthquake. These animals appeared well-nourished, healthy, and not aggressive. More than a third (37.3%) of dog owners chose not to keep their animals in the tent camps. Some owners, especially in the suburban and rural areas, were able to keep their dogs on their properties, which were accessible even if unfit for human occupation. Pet food was properly stored in 97.5% of inspected tent camps. Dogs were fed with food leftovers from the camps' kitchens in 20.4% of inspected tent camps, whilst owners fed their companion animals leftover meals in 23.2% of inspections. Removal of garbage, as well as human and animal waste, was appropriately and regularly managed in almost all camps. The responsibility for monitoring the health and housing conditions of animals, as well as the distribution of cleaning equipment and materials for collecting faeces, was assigned to the Head of Health Services at the tent camps. Overall, the condition of owned animals appeared adequate, with only 1.4% found in poor health and 0.7% inadequately housed. As a result, additional health checks were planned, prescriptions were issued, and specific situations were monitored. The animals were found to be sociable and non-aggressive in 97.2% of inspections. No attacks on people or other animals were reported.

The number of displaced people in tent camps significantly decreased in September 2009. A final census was conducted to facilitate the relocation of the last displaced people from the tent camps to other accommodation.

Management and control of the feline population

By their nature, cats, whether owned or free roaming, generally adapt to changing living conditions (Jongman 2007). Nevertheless, it was necessary to

provide care for cats left behind by their owners or no longer assisted by their usual caregivers. As seasonal reproductive cycles approached, surgical sterilisation was needed to avoid uncontrolled reproduction and mitigate the risk of environmental, health, and ecological problems. The growing number of cat colonies complicated efforts to find appropriate housing and provide care for non-self-sufficient animals (i.e. kittens, elderly or sick cats). Consequently, it was necessary to strengthen existing structures in the sanitary kennel, especially for animals that were difficult to integrate or reintroduce into the territory.

The management of the feline population took place in four stages: (1) recovery, assistance, and hospitalisation of non-self-sufficient or sick individuals; (2) geo-referencing and census of cat colonies, and installation of feeding stations; (3) demographic control and surgical sterilisation; and (4) promotion of adoption and temporary fostering.

From 15 September to 15 November, approximately 400 adult cats were sterilised and reintroduced into their original colonies. The number of free-roaming cats in the area was estimated, as there was no census of these populations. Many owned cats were lost and joined others already present in areas where public access was completely prohibited due to unstable buildings. In order to provide cats with adequate assistance, 131 geo-referenced cat feeding stations were established, assisting 401 individual cats. Animal protection associations monitored the feeding stations, managed daily needs and provided veterinary assistance to prevent the spread of diseases. These actions were inspired by the principle of the protection of companion animals as sentient beings (European Union 2007), recognised as having a social function in the improvement of human quality of life (Council of Europe 1987).

In-field veterinary assistance in the affected area

Immediately after the help desk activation, it became clear that the most urgent requests for assistance concerned the rescue of animals trapped in the "red zones" of L'Aquila that were off-limits to public access for safety reasons, as well as in the surrounding municipalities in the affected area (DCP 2016). Veterinary teams were deployed by the VA in collaboration with the Mixed Operational Centres established throughout the territory by the DCP to facilitate the coordination of emergency services. In-field interventions are shown in Table 3.

At the same time, local and national NGO published and disseminated requests for adoption, ensuring a quick turnover of hospitalised animals, which were micro-chipped and photographed. A specific form was developed to facilitate the return of lost animals. The *Adopt or Find Your Four-Paws Friend* web page was activated on the IZSAM website in collaboration with the Lost and Found Animals Association, showing photographs and details. The forms for reporting lost and found animals via fax were distributed by Mixed Operations Centres from 8 April–31 December; a total of 854 interventions occurred, which resulted in the individual electronic identification and registration of 608 animals.

Table 3. In-field interventions relating to companion animals (April to December 2009) by veterinary crisis units deployed by Veterinary Action following the earthquake in L'Aquila (Abruzzo, Italy) on 6 April 2009.

Activity	Number
Unowned free-roaming animals	
Dogs	465
Cats	384
Animals lost by the owners	
Dogs	81
Cats	212
Injured animals	
Dogs	57
Cats	155
Animals abandoned by the owners	
Dogs	130
Cats	98
Total	1,582

The exceptional influx of animals to the L'Aquila sanitary kennel was compensated by the support of a dog handler and two shelter operators provided by the IZSAM, and benefited from collaboration with local NGO, veterinarians, and veterinary technicians provided by other LHU/AUSL. To ensure prompt hospitalisation of distressed animals and rapid reunification with their owners, the kennel's capacity was doubled to 50 animals with a custom mobile kennel. Other supplies included medications, consumables, medical equipment, transponders, and readers for electronic identification devices, management software, a shipping container, and a veterinary ambulance. Carcass disposal was carried out by a private company. A solidarity network, coordinated by major national NGO, promoted temporary fostering of dogs and cats, facilitating their placement with private individuals and organisations. This accelerated the turnover and increased the number of animals rescued.

Promoting individual and collective responsibility for animals to the general public was essential for their welfare. However, obtaining institutional support to promote animal adoptions through public advertising channels could have been strongly improved by establishing an emergency communication network in the preparedness phase.

Results of veterinary assistance performed at the sanitary kennel from April to December 2009 are presented in Table 4.

Companion animal assistance in the tent camps

A basic level of care for all animals in the tent camps was necessary. Prompt response for assistance from owners to prevent possible animal abandonment

Table 4. Veterinary assistance performed at the Local Health Unit (LHU/AUSL) sanitary kennel (April to December 2009) following the earthquake in L'Aquila (Abruzzo, Italy), on 6 April 2009.

Activity	Number
Dogs	
Recovered in the field	884
Inspections for dog recovery from houses	64
Recovered from houses	10
Adopted	486
Transferred to other facilities	229
Returned to their owners	158
Reintroduced into the field	9
New dog identifications	1,559
Cats	
Recovered in the field	325
Inspections for cat recovery from houses	252
Recovered from houses	72
Adopted by private individuals	129
Transferred to other facilities	76
Returned to their owners	151
Reintroduced into the field	5
Other species (e.g. tortoises, birds, fish)	
Inspections for recovery of other animals from houses	13
Other animals recovered from houses	13
All animal species	
Clinical assistance interventions	3,738
Surgical assistance interventions	805
Owners assisted requesting feed and medications	1,181
Lost animal search in archive	179
Assisted camps	84
Reports received (aggressive animals, etc.)	404
Requests for recovery of dead animals	6
Total	10,832

was equally important. Cages, kennels, collars, carriers, modular boxes, blankets, waste collection bags, along with dry or canned food and dietary feed, were distributed in the tent camps. All donations from private individuals, associations, and companies were initially stored at the sanitary kennel in L'Aquila and delivered by volunteers. Supplies were distributed following periodic requests received on supply forms (Supplementary Information 2) from the tent camps' offices. Permanent veterinary assistance was provided by four temporary veterinary clinics. Table 5 details the services provided.

Thirteen local veterinarians were trained in dog identification and registration procedures and performed the electronic identification of unregistered animals that were also tagged with fluorescent collars. This activity took 3 weeks and resulted in the registration of 1,395 owned dogs: 711 females (18 were spayed) and 684 males (1 castrated), housed in 156 tent camps. The assistance package included optional and free-of-charge surgical sterilisation or contraceptive medication, both aimed at minimising the issues related to the oestrous cycle of female dogs; however, this was only taken up for 175 animals (151 females and 24 males).

Table 5. Services provided to animals in tent camps set up to accommodate displaced people by four temporary clinics (24 April to 8 June 2009) following the earthquake in L'Aquila (Abruzzo, Italy) on 6 April 2009.

Activity	Number
Dogs assisted	645
Dogs visited	444
Cats assisted	398
Cats visited	284
Surgical procedures	33
Laboratory analysis	17
Assistance to other animals (foals, turtles, parrots, rabbits)	12
Animals sent for hospitalisation at UNITE (Teramo, Italy)	45
Lost animals	6
Found animals	5
Abandoned animals	4
Dogs identified with microchips	9
Total	1,902

Severe overcrowding in tent camps increased the risk of zoonotic diseases and human–animal coexistence problems (Braam *et al.* 2021). Disagreements between animal owners and non-owners were an additional issue. Specific surveys commissioned by the Department of Veterinary Public Health and Animal Pathology at the University of Bologna revealed that the risk of zoonotic disease transmission (Salomon *et al.* 2020; Yıldız Zeyrek *et al.* 2023) was very low and suggested focusing attention on the occasional discomfort caused by insect bites, with potential allergic complications. Considering the climatic and environmental factors, and the location of the tent camps in close proximity to livestock farms, specific interventions were planned, recommending the use of easy-to-store, long-life, nutritious commercial pet food. Animals were treated monthly with ectoparasiticides, and for internal parasites if infection was clinically evident. Posters entitled *Your Four-Legged Friend in the Reception Areas* were distributed in the tent camps to proactively engage animal owners.

Specific campaigns were also carried out in collaboration with NGO to promote responsible ownership of companion animals and encourage the sterilisation of owned animals. In the initial phase of the emergency, private practitioners from L'Aquila offered their support along with colleagues from other regions. Most of them assisted dogs and cats temporarily living in hotels, residences and campsites, while others also treated free-roaming, rescued and adopted animals. Almost all worked either *pro bono* or charged discounted rates. Nine hundred veterinary procedures, including consultations, clinical visits, and surgeries, were performed. Subsequently, an agreement was made between VA and the Board of Veterinarians of L'Aquila province for the assistance of companion animals, recognised as one of the essential veterinary public health actions. The services provided were later compensated by DCP.

At the time of the earthquake, there was only one animal protection or veterinary association recognised as a Civil Protection Association. Nevertheless, a large number of volunteers arrived in the earthquake area in the aftermath of the disaster. One of the first VA actions was to promote an agreement between the three major NGO – Ente Nazionale Protezione

Animali, Lega Anti Vivisezione, and Lega Nazionale per la Difesa del Cane – to operate under a unified coordinated system. Volunteers were therefore accredited and deployed in operational teams on the basis of their animal handling skills, experience of veterinary emergency management, and level of autonomy. These teams reported the location of injured or trapped animals in damaged homes or "red zones"; rescued/recovered animals; carried out census activities and monitoring of animal housing; assessed the needs of owned animals in tent camps; distributed pet food and shelter equipment; and provided information to the public about VA services and responsible animal ownership.

In total, 250 volunteers (including 70 animal welfare officers and 13 veterinarians, behaviourists, or dog trainers), organised into 42 operational teams, were deployed. Six supported the L'Aquila sanitary kennel activities, and eight worked alongside the National Fire Brigade personnel.

Farm animal health and welfare

The immediate response of the livestock production sector was due to an autonomous reaction of public institutions, breeder organisations, industry support to farmers, and animal production operators. Emergency response activities were mainly conducted during a short time from 10 April to 7 May.

National identification and registration systems require farmers to maintain current records of their animals. Animal registration databases are necessary for understanding the demographics of animal populations (Wismans 1999) and tracing animal movements. However, the limited availability of reliable data on the livestock production sector, allegedly due to uneven compliance with livestock identification legislation, made it necessary to collect field information in support of the evidence-based decision-making process. An emergency management information system for livestock farm inspection management was promptly developed by the IZSAM to store and process emergency-related information.

Four situational awareness teams composed of an IZSAM veterinarian and a private practitioner performed in-field evaluations daily to assess the impact and determine assistance needs. Farms were identified, geo-referenced, and inspection results recorded. Daily reports on the number of animals present and farms visited in the various municipalities were generated. For each farm, a standardised collection of information was carried out to identify critical issues and plan interventions based on their nature and urgency.

The assessment teams used a simple form (Supplementary Information 3) to collect data, resulting in improved communication and resource allocation. The form captured data on the number of animals that were alive, required urgent slaughter or were dead (as a result of the earthquake, or culling) and required carcass disposal. The status of the farms' personnel, equipment, facilities (including those for milking and preserving milk), water supply and feed availability was also recorded. The inspections of livestock facilities started within 5, 10, and 20 km of the epicentre and were coordinated with other operational centres and technical teams at the DI.COMA.C level. This information system was used to prioritise intervention activities, the distribution of feed and veterinary medicines, the relocation of animals from damaged shelters, and the activation of commercial channels for animals that had reached their slaughter weight.

A total of 2,126 farms were inspected in 35 municipalities, with 72.8% of the visits occurring in the first 15 days, involving 27 veterinarians. During the inspections, 98 facilities were found to be non-compliant, and 83 facilities lacked a water supply. Cattle, buffalo, sheep, goats, horses, donkeys, mules, poultry, pigs and rabbits were present on farms. Results are reported in Table 6.

Numerous challenges were faced with the production, transportation, storage, and distribution of milk from smallholder farms to consumers. The involvement of milk collection centres located outside the seismic area proved to be an effective bridge between dairy farms and the dairy processing industry. Water and forage supply, hay and feed quality and availability, housing, carcass disposal, and slaughter were issues of lesser concern. The direct damage to farmers was limited; however, the indirect damage was substantial and prolonged.

The displacement of the population to tent camps disrupted the local market, creating difficulties for farmers in selling their products. Moreover, direct management of food suppliers in the tent camps by DCP made it difficult for farmers to access this new market. The efforts made to restore the livestock

Table 6. Number of animals identified on farms (n = 2,126) in the area affected by the L'Aquila earthquake (6 April 2009) by farm inspections (10 April to 7 May 2009) carried out by "situational awareness" veterinary teams.

	Number of animals				
Species	Present	Dead	Culled	To be slaughtered	Carcasses requiring disposal
Cattle	10,439	33	4	67	2
Buffalo	26	1	1	0	1
Sheep	50,876	173	0	480	3
Goat	2,257	0	0	10	0
Horse	2,738	1	0	0	0
Donkey	181	0	0	0	0
Mule	55	0	0	0	0
Poultry	30,855	138	0	NR	0
Pig	4,508	0	0	NR	0
Rabbit	29,347	49	0	NR	0

NR = not reported.

sector to as normal a state as possible were not supported by specific procedures to facilitate a quick recovery of the local economy, particularly the dairy sector. This problem was further exacerbated by difficulties in accessing banking credit systems, as private properties were heavily damaged and therefore worthless.

The actions taken by the VA were aimed at quickly restoring normal activities related to the health and welfare of livestock (Dalla Villa *et al.* 2020), while addressing public health issues (i.e. antimicrobial resistance, spread of infectious diseases, public safety matters) (Squarcione *et al.* 2010). The continuity of control operations for major zoonoses (i.e. brucellosis and tuberculosis) was ensured by the availability of public veterinarians deployed by nearby LHU/AUSL. A feed storage hub and a controlled distribution of livestock feed, mainly donated by national agricultural organisations, was established at the Campo Boario in Onna. This facility was well located and easily accessible for transporters and users. Adequately protected storage premises for bulky (hay) and concentrated feed were also available to maintain their quality and to prevent biosecurity risks. This reassured farmers and facilitated collaboration between associations, veterinary services, private practitioners, and the farmers themselves.

Veterinary assistance and distribution of veterinary drugs donated by pharmaceutical companies were secured by local private practitioners. The LVS of the LHU/AUSL performed their disease surveillance and control activities, managed animal registries, regulated animal movement, and organised disinfection and pest control measures. To ensure the quick restoration of animal disease control plans, VA provided the equipment and the logistics for the delivery of biological samples to the IZSAM laboratories.

Food safety and hygiene

As part of its responsibilities in the management of the earthquake response, the Food Safety and Hygiene area of the VA was responsible for safe meal delivery to displaced people and the restoration of food production and trade. Public health protection through proper hygiene practices was critical due to limited volunteer training and the use of makeshift equipment.

Most tent camps were operational from 6–19 April 2009, with a peak of 36,990 people on average per day (DCP 2010). The first field kitchens (n = 36) were established in the first week after the event. The number peaked at 105 field kitchens 7 weeks later, and approximately 80 were still in operation 4 months after the earthquake. Kitchens were primarily managed by DCP staff and assigned to either culinary professionals or local staff and volunteers.

A surveillance system was implemented to ensure multiple objectives were achieved. These related firstly to the provision of adequate facilities: a census of kitchens and food storage areas in tent camps; monitoring of temporary/mobile food establishments; verification of the potability of the water supply in the tent camps and primary production facilities. It was also important to provide informative material to training operators involved in food preparation and distribution; verify the application of hygiene guidelines in kitchens in tent camps and hotels; manage the disposal of spoiled food; and process faecal samples to diagnose food-borne illnesses. Lastly, it was critical to develop systems for data sharing and management.

Inspections were planned and executed by a team composed of Official Veterinarians of the AUSL/LHU, IZSAM technicians, and NAS officers. From 8–18 April 2009, 111 of 133 tent camps were surveyed. A data collection form was used to gather information by location on responsibility assignment, number of guests, water, electricity, and gas supply, presence of treatment systems, waste management, availability of sanitary facilities, on-site kitchens, and hygiene management. Food preparation, storage and waste management; availability of appropriate equipment (refrigerators, freezers, ovens, etc.); number of daily meals prepared; personnel handling and serving food; and staff rotation frequency, were constantly monitored. This approach provided a real-time overview of the situation and enabled immediate identification of risk levels and prioritisation of interventions.

Inspections identified a lack of specific knowledge in food handling, preparation, and distribution, and this was addressed as a priority, with rapid training and provision of written information materials. The high number of daily meals led to a weekly rotation of personnel and proper guidance for the smooth handover of responsibilities between arriving and departing teams was often lacking. The lack of infrastructure, operational procedures and trained personnel created problems in receiving and distributing food.

In the second week after the earthquake, the F3 – "Media and Information" support function released *Guidelines for Correct Hygienic Practices in Canteens in Tent Camps* (DCP and IZSAM 2009). The guidelines were used as part of operator training and kitchen inspections and were based on the requirements outlined in the European Union Regulation (EC) 852/2004 (European Commission 2004). Posters outlining rules for preventing food-borne diseases, using easy-to-understand language were displayed in kitchens and dining areas. Following further observations of meal preparation and dining practices, guidelines for operating collective catering were revised and distributed.

From 21 April to 5 May 2009, 118 tent camps were visited, and 644 operators were trained using the

revised guidelines. After verification, any problems identified were discussed with the staff, who were instructed on the immediate corrective actions.

From 4 May to 20 August 2009, a total of 352 weekly inspections were conducted, and a number of concerns were identified. An insufficient number of refrigerators and freezers was reported, creating issues with food spoilage, continual monitoring, defrosting, and the mingling of food products stored. Inadequate protection of areas from external personnel or animals was often observed. In many tent camps, meal preparation and distribution took place in rooms with gravel flooring. Large quantities of various items, both food and non-food, arrived immediately following the earthquake in a disorganised manner. Products were stored with no regard to type or expiration date, and without proper elevation from the floor. Sanitary services equipped with dedicated sinks exclusively for kitchen staff were almost non-existent.

The warming weather revealed structural deficiencies, such as the lack of insulated containers for food storage. Shade tarpaulins were used to reduce the internal temperatures of storage rooms. A lack of insect barriers on doors and windows in food preparation, storage, and serving areas was also observed. Display readings of the refrigeration equipment were routinely checked as there were few temperature logs.

Inspections of hotel kitchens located along the coast began on 4 May 2009. Water samples were taken for *Legionella* spp. testing and to verify the potability of stored water. By 3 July 2009, 83/517 facilities registered by the DCP and selected through stratified sampling based on their accommodation capacity were inspected. In one inspection, expired food products were found, and legal sanctions were applied.

Surveillance of mobile and/or temporary structures for the sale and distribution of food

Official controls were enforced on mobile and/or temporary structures selling and serving food products and ready-made meals, sourced from the local area and neighbouring provinces. The inspections focused on authorisations and compliance with regulations. Samples were taken in case of visibly altered food or suspicion of contamination. Non-compliance was reported to the relevant authorities for appropriate measures.

Management of disposal of spoiled food products

Damage to buildings and storage infrastructure led to power outages. This resulted in poor refrigeration in production and storage facilities, retail outlets, tent camps and households, leading to the spoilage of stored food. Non-perishable food was rendered unsuitable for human consumption due to damaged packaging. Operational procedures were developed for the proper disposal of unsuitable food products to prevent consumption. By 23 July 2009, 152,793 kg of animal-based food products from production facilities and commercial establishments had been inspected, certified, and disposed of as special waste in accordance with European Union Regulation (EC) 1774/2002. Other products were disposed of as municipal solid waste.

Verification of potability of network water in tent camps and primary production plants

From 20–23 April 2009, 47 water samples were collected from 39 tent camps and eight primary production facilities and examined for bacterial and chemical contamination. Analysis by the IZSAM revealed the presence of *Clostridium perfringens* and *Pseudomonas aeruginosa*. The water supply in the affected tent camps derived from the public network, but since no other area tested positive, the result may have been related to issues within the field kitchens. However, no samples were taken at the water entry point into the tent camps, and the source of the contamination could not be confirmed. Chemical parameters were within the normal range, except for elevated levels of active chlorine in one sample, probably due to the chlorination process taking place at the time of sampling. Repeated sampling 2 days later showed normal chlorine levels.

Examination of human stool samples to determine the cause of foodborne illnesses

The IZSAM made its diagnostic service available for cases of gastroenteritis reported in two tent camps and a hotel on the coast. In the absence of DCP protocols for the management of gastroenteritis outbreaks in tent camps, instructions were prepared for the collection and sending of samples to the laboratory. An information sheet on the operational procedures to be followed by the staff and guests was distributed to each of the affected structures.

Information management system

The aim of the module *Management of food safety activities in tent camps and accommodation facilities* of the IZSAM information system was to harmonise controls of all personnel involved in field operations. It allowed management of the registry of tent camps and kitchens, tracking of the number of staff, guests and daily meals prepared, as well as collection and management of control results online, providing detailed and summary reports to the Head of Function 02. The availability of these data enabled intervention planning based on risk levels and ensured follow-up for tent camps with the most significant non-conformity.

Later developments to the emergency response system

Following the L'Aquila experience, the NCPS has been repeatedly challenged by other non-epidemic disasters in northern and central Italy (Dalla Villa *et al.* 2019). In parallel, several important initiatives were taken at the national and international levels. In 2013, the IZSAM was appointed as the National Reference Centre for Urban Hygiene and Non-Epidemic Emergencies (IUVENE) by the Ministry of Health. In 2015, the World Organisation for Animal Health (WOAH) endorsed the conference on "Natural Disasters and One-Health – Are We Prepared?", organised with the support of the European Commission.

On this occasion, it was made very clear that humans, animals and the environment are interlinked and the imperative of considering a One Health holistic approach was advocated (Squance *et al.* 2021; Anthony and De Paula Vieira 2022). In 2016, the *WOAH Guidelines on Disaster Management and Risk Reduction in Relation to Animal Health and Welfare and Veterinary Public Health* (WOAH 2016) were adopted by the assembly of delegates, with the purpose of strengthening the capacity of governmental and non-governmental veterinary services to protect animal health and welfare, safeguard human and environmental health, and help to restore social and economic conditions in the aftermath of a disaster (Dalla Villa *et al.* 2017).

The implementation of a specific framework, including processes, protocols and procedures covering all phases of the emergency management cycle (Stone *et al.* 2022), was recommended. At the same time, a consistent set of good practices for preparing, delivering and learning from simulation exercises was developed with a focus on disaster preparedness. In 2018, WOAH's Platform on Animal Welfare for Europe launched a capacity building programme aimed at promoting a culture of preparedness and encouraging the development of contingency plans (WOAH 2014), whilst the Directorate-General for Health and Food Safety of the European Commission undertook a 2-year project aimed at gathering detailed information on levels of preparedness for dealing with non-epidemic disasters in member states, and on the existing mechanisms for cooperation and coordination with the various civil protection systems (Anonymous 2018).

To better address the on-going challenges posed by a growing number of large and small-scale disasters and promote a new culture of risk prevention and mitigation in the management of veterinary emergencies at the international level, the WOAH Collaborating Centre Network for Veterinary Emergencies (EmVetNet) was established in 2018 between the WOAH Collaborating Centre on Veterinary Training, Epidemiology, Food Safety and Animal Welfare (IZSAM, Italy), the WOAH Collaborating Centre for the Reduction of the Risk of Disasters in Animal Health (CENSA, Cuba) and the WOAH Collaborating Centre for Biological Threat Reduction (Texas A&M University, USA). In parallel, Abruzzo adopted a plan for the management of major emergencies, creating an organisational model as a single framework of intersectoral cooperation and procedural standardisation of veterinary interventions (Anonymous 2018).

In 2021, a joint OECD-FAO project was dedicated to building resilience in the Italian agrifood sector, highlighting the valuable function of specific emergency management tools such as the Veterinary Information System for Non-Epidemic Emergencies (SIVENE) (Di Lorenzo *et al.* 2019) developed by IUVENE.

Discussion

Earthquake-related disasters frequently have detrimental social, environmental and economic effects, significantly amplified by pre-existing conditions (Heat and Linnabary 2015; Aksoy *et al.* 2025). The primary duty of the NCPS is to minimise the impact of these events on human and animal populations, infrastructures and the environment, according to its economic and technological resources. This requires the development of organisational competencies and specific professional skills to sustainably address any type of emergency, in coordination with the human health, the animal health and the environmental health sectors, with a One Health approach.

Since 2001, a ministerial order has provided for the issuance of specific contingency plans to be prepared at the provincial level (Anonymous 2001). However, this document was not translated into an operational plan for the L'Aquila province, resulting in the lack of intervention and coordination procedures, with no definition of precise roles and responsibilities for individuals and organisations involved in the disaster management cycle.

As expected, the seismic impact deeply challenged the Veterinary Services' capacity to manage acute criticality and to mitigate veterinary public health risks, in the absence of adequate emergency management tools. In the described context, which was complex and, in some ways, unpredictable, an integrated emergency management operational framework was built around the involvement of public and private components and implemented with the support of the local competent authorities and NGO volunteers. This approach proved to be effective in recognising and prioritising needs, organising and managing the resources deployed, and preventing overlap or duplication of rescue activities, thus improving efficiency and flexibility. It included the definition of a set of detailed actions to be implemented under a

centralised strategic direction and the development of a tailor-made data management system to enhance the efficacy of the informed decision-making process.

As in other catastrophic events, the L'Aquila earthquake confirmed the Veterinary Services' essential contribution to the management of non-epidemic emergencies, considering the complexities and interconnections of the diverse factors that might have impacts on preventive functions and risk mitigation activities. Full integration of Veterinary Services in disaster management systems through the definition of responsibilities and tasks endorsed by a legal framework was also identified as critical. A single leadership ensured the coordination of various institutional bodies, volunteers, and public and private veterinarians, enabling the optimal use of instrumental and professional resources, and strongly contributed to the indisputable success achieved.

Since 2018, the Italian Civil Protection code has established a clear juridical mandate to protect animals in addition to "*human life, physical integrity, property, settlements and the environment from damage or the danger of damage resulting from natural disasters or deriving from human activity*" (DCP 2018). The norm consolidates the NCPS decentralised operational model and promotes straightforward, timely and outcome-oriented decision-making processes based on the collection, analysis, and application of data for preparedness and response purposes.

The experience of managing the L'Aquila emergency, intense both emotionally and professionally, required high technical expertise combined with empathy. It highlighted the need to incorporate veterinary services in the preparedness phase of disaster management and response networks, and the importance of effective, accurate and timely communication as the basis of an efficient, informed decision-making process. It represents a turning point in veterinary emergency management, and should be taken into account to develop all-hazard contingency plans aiming at enhancing organisational resilience, resource efficiency, coordination efforts, and response capabilities across diverse potential threats.

The response to the L'Aquila earthquake is another example of the resilience of veterinarians in the face of unpredictable crisis. The IZSAM's flexibility in adapting its organisational structure and securing a coordinated response through a central chain of command was key to the implementation of a disaster management surveillance system, to avoid overlaps in interventions and the dispersal of resources. Human and animal health were considered as a single issue to be addressed in an integrated manner, improving the overall effectiveness of the response.

In any emergency situation, it should be clear who decides on and assumes the operational responsibility for, the interventions to be carried out. At the time of the L'Aquila earthquake, the Head of the DCP reported directly to the Prime Minister, who assumed the overall political responsibility of the implemented actions (Figure 2). Conversely, the 2012 reform of the NCPS and the creation of a Ministry with a highly bureaucratic structure and multiple lines of command have favoured the fragmentation of the organisational structure, potentially leading to inefficiencies and delayed responses. Moreover, the inclusion of the "management of public health activities and assistance" in the scope of the Office I (Volunteering, Training, and Assistance) has relegated the support function F02 – the first to intervene for prevention, risk mitigation, and assistance – to an ancillary position. This function should remain under the responsibility of the Head of the DPC, explicitly considering, alongside human resources, the role of central and peripheral veterinary structures.

The findings of the current report highlight the need to invest in multiple areas, including the development and validation of contingency plans and related operating procedures; professional development on disaster management and risk reduction by continuous learning and testing operational capacities with simulation exercises; and upgrading or developing new electronic tools for use by veterinary services in catastrophic situations.

It is the authors' intention that this report will not only serve as a historical record but will also inspire others to take action by sustaining strengths, building on best practices, and addressing areas for continuous improvement in the management of veterinary emergencies, at local and global levels.

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