

## IMPLEMENTATION OF A GEOGRAPHICAL INFORMATION SYSTEM FOR EPIDEMIC EMERGENCIES

Battistini M.L., Bellini S., Giovannini A., Caporale V.<sup>1</sup>

*A Geographical Information System (GIS) has been implemented for epidemic emergencies in the Abruzzi region of Italy; at present only one province has been taken into account for the experimentation. This GIS was planned to record the geographical coordinates of the farms and the other structures necessary to deal with such emergencies in the veterinary field. The first step was to geo-reference the existent sanitary information and for those structures or farms whose census register was not updated or lacking an ad-hoc questionnaire was prepared. Since no disease emergency occurred during the year of the experimentation, the procedures were tested through simulations. Simulations were intended to test the performance of veterinary services and the suitability of the implemented GIS in case of a foot-and-mouth disease outbreak.*

### INTRODUCTION

The first phase of a Regional Geographical Information System (GIS) to support epidemic emergencies management, has been implemented in one Province of the Abruzzi Region in Italy.

The GIS was planned to: (i) record the geographical coordinates of the farms and the other structures necessary to deal with in case of veterinary emergencies and (ii) connect automatically to both the animal identification system data base and Animal Movement system of the European Union (ANIMO).

### MATERIALS AND METHODS

Sony hand-held GPS were used to collect longitude and latitude coordinates of: cattle and swine herds, small ruminants flocks, slaughterhouses, trade holdings, cattle importers, refrigerated meat stores, livestock markets, meat processing plants, central dairies and cheese factories. Data relevant to emergency management concerning the aforementioned structures were also recorded as well as summer pasture locality of transhumant sheep and goat flocks. Digitized maps (1:100.000) of administrative boundaries, hydrology and roads were used as layers. The software used was MapInfo Professional 4.0.

Animal identification system data base software was developed by the Institute and holdings identification data comprise also geographical coordinates. ANIMO data are provided by the Ministry of health, Dipartimento alimenti e nutrizione e sanità pubblica veterinaria.

### RESULTS

A total of 2.792 cattle herds, 421 swine herds, 3.092 small ruminants flocks, 11 slaughterhouses, 25 trade holdings, 12 cattle importers, 3 refrigerated meat stores, 5 livestock markets, 19 meat processing plants, 3 central dairies and cheese factories were geo-referenced in the study area (Teramo province).

Since no disease emergency occurred during the study period, the procedures were tested by simulations. Simulations were intended to test the performance of veterinary services and the suitability of the implemented GIS in case of a foot-and-mouth disease outbreak. Field, laboratory and administrative procedures were simulated and evaluated. GIS was used to define buffer zones around the infected farm and to list all structures and herds of susceptible species within the buffer zone. The Animal identification data base provided a detailed vision of the population at risk in real time. ANIMO data allowed to sort out possible origin due to import quite rapidly for an efficient tracing back investigation. The completeness of veterinary services and GIS archives was evaluated by field investigation and census of all farms in the buffer zone. The precision of GPS's was evaluated by repeated coordinates collection in the buffer zone and comparison with recorded data.

### DISCUSSION

The use of GIS appears, on the whole, to increase considerably the efficacy of communication. Management of veterinary service tasks and resources during emergency was improved by the geographical analysis. Timely description of geographical disease dynamics, of risk factors due to spatial relationship, to orography, hydrography, and roads features as well as the drawing of risk and damage maps became actually feasible. A byproduct of the system implementation was the updating of the register of the structures that could be involved in an epidemic emergency. At the moment connection of the system described with the automated Local veterinary service information network, to collect on-line animal products veterinary certificates data, is under way. This information will allow the follow up of animal products shipment originating from suspected facilities/lots.

### BIBLIOGRAPHY

- Burrough P.A., 1993. Principles of geographical information systems for land resources assessment. Oxford University Press Inc., New York NY USA., 194 pages.
- Pfeiffer D.U., Morris R.S., Sanson R.L., 1994. Application of GIS in animal disease control - possibilities and limits. Proceedings of WHO Consultation on Development and Application of Geographical Methods in the Epidemiology of Zoonoses. Wusterhausen, Germany, May 30-June 2.
- Sanson R.L., Pfeiffer D.U., Morris R.S., 1991. Geographic information systems: their application in animal disease control. Rev. sci. tech. Off. int. Epiz., 10 (1), 179-195.

<sup>1</sup> Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale", Via Campo Boario - 64100 Teramo- Italia