

Chapter 1

Introduction to the research project

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1. Introduction and background of the project

The European Union (EU) aims at assuring a high level of animal health and animal welfare without compromising the functioning of the internal market (Mission Statement DG Health and Consumer Protection; Anonymous, 2004). This requires a comprehensive EU approach to combating epizootic livestock diseases (Byrne, 2002), of which Avian Influenza (AI) is one.

In the last decade however, epizootics of AI occurred in several member states of the EU, particularly in Italy and The Netherlands. The impact of these outbreaks was not only large numbers of animals to be culled, but also a large economic damage, disruption of social life in the affected areas and large consumer concerns about animal welfare. Moreover, the potential impact on human health was recognized by the general public.

Intensive trade contacts (of animals and livestock products) between member states pose considerable risks to the poultry populations in the entire EU once a single member state is struck by an outbreak of AI.

In some member states (i.e. The Netherlands and Germany), consumer concern has increased largely with respect to disease control related ethical and animal welfare issues, as well as the risks for human health. AI was recognized as a potential risk for humans in particular cases (Alexander, 2003).

Quite obviously, strategies and measures for prevention and control of epizootic livestock diseases need improvement to fulfill the EU objectives formulated in the mission statement, i.e. the establishment of strategies which are more efficient, ethically acceptable, and less costly. Self evidently, because of the single market context of EU livestock production, only a comprehensive approach at the level of the EU is likely to be successful. The aim of the Healthy Poultry project was to address these issues, particularly from a European perspective.

1.2. General objectives of the project

The overall objective of the project was (1) to develop new integrated strategies for prevention, control and monitoring of epizootic poultry diseases, (2) to analyze these strategies in a comprehensive way and (3) to ultimately provide guidelines for the implementation of these strategies in EU member states. In this way, more effective, more animal welfare friendly and social and ethical acceptable as well as more cost-effective prevention and control of epizootic poultry diseases will become possible. In order to be successful and cost-effective, strategies for prevention and control of AI particularly should take account for regional specific aspects such as demographic features (e.g. density of holdings and animals and organization of production) and region specific risk factors for introduction and spread. This holds particularly for poultry, because regions can quite differ with respect to numbers of particular poultry species (such as chicken, turkey and ducks) (Capua and Marangon, 2000; Windhorst,

2002), and significant differences between species with respect to clinical diagnosis and virus spread of AI have been demonstrated (Easterday and Hinshaw, 1991). Moreover, this complies with the EU principle of regionalization of epizootic disease control (CEC/VI/B/II.2). With respect to AI, a very specific aspect should also be included, i.e. the role of migratory birds. It has been demonstrated, that these birds pose a major risk factor for introduction of AI in disease free areas (Munster et al., 2003; Capua et al., 1999). Finally, poultry production is largely integrated in production chains, and involves a large variety of stakeholders, e.g. primary producers, supply and processing industry and retailers. Awareness of the risks of AI and the possibilities of improved prevention and control is essential for their cooperation. Moreover, the awareness of decision makers throughout the EU also should be encouraged.

Based on the above, the following three strategic research objectives were distinguished:

1. The development and standardization of data and methods to identify poultry production areas according to their density, organizational and economic structure and contact structure, or in other words, according to their ‘general or base risks’ for epizootic poultry disease introduction and spread;
2. Identification and quantification of risk factors for introduction and spread of AI at regional and farm level, i.e. AI specific risk factors;
3. Definition and epidemiological and economic analysis of strategies for monitoring, prevention and control of AI and formulation for guidelines for implementation of new AI policies.

1.3. Detailed research plan, deliverables and organization of the report

The three strategic research objectives mentioned above were organized in three separate Tasks. Each Task was subdivided into several Work Packages (WPs), each with specific aims and deliverables, which are described below.

1.3.1. Task A: : Development and standardization of data and methods to identify poultry production areas according to their density, organizational and economic structure and contact structure.

Task A focused on issues related to ‘general or base risks’ for epidemic poultry disease introduction and spread. This Task included the following WPs and main scientific activities.

WP2: Spatial, structural and demographic issues.

This WP focused on (1) data collection in the four participating countries and in the rest of the EU member states from various sources (poultry censuses, cadastral databases and identification and recording systems (I&R) for poultry), (2) the development of a flexible and standardized database structure based on geographical coordinates of individual poultry holdings, and (3) the development of parameters for identification of poultry production areas according to density and demographic characteristics, derived from spatial indices.

WP3: Organizational and economic issues.

This WP was involved in (1) data collection from statistical and agricultural economic offices and agricultural research institutes, (2) the development of a database, and (3) subsequent descriptive statistical analysis of structural and organizational data.

WP4: Migratory bird issues.

Within this WP, the following activities were carried out: (1) data collection throughout Europe from national and international wildlife databases and offices on types of migratory birds, routes, quantities and time of year these routes are utilized, (2) the development of a database, and (3) a descriptive statistical analysis of these data, focused on e.g. distribution patterns in function of area, region and time.

WP5: Integration in a GIS, spatial analysis and toolbox development.

Within this WP, the databases developed in WP2 to WP4 were integrated to enable the development of a GIS-based toolbox for spatial, structural, demographic and basic disease risk analysis using geo-statistical and spatial techniques.

Within Task A, the methodology mainly consisted of (1) collection of various types of data for different sources, (2) database development, (3) analysis of these databases (predominantly descriptive statistical and spatial analysis), and (4) integration of the various databases into one GIS-based toolbox.

The main deliverables of Task A were:

- Spatial parameters and conversion tables;
- An organizational and economic database;
- A farm economic analysis of poultry production;
- A spatial, structural and demographic database of poultry production;
- A database on migratory birds issues;
- A descriptive analysis of migratory birds issues;
- A GIS-based toolbox for spatial, structural, demographic and basic disease risk analysis;
- A spatial and geo-statistical analysis of poultry production.

Part of these deliverables were integrated in other WPs and deliverables respectively.

1.3.2. Task B: Identification and quantification of risk-factors for introduction and spread of Avian Influenza at regional and farm level

Task B focused on issues related to AI specific risk factors for introduction and spread, both at regional and farm level. This Task included two WPs.

WP6: Epidemiological analysis of the Italian data on AI.

Within this WP, together with WP7 the development of a common analysis framework and approach to be used was elaborated. Subsequently, a database was developed from disease control data of epidemiologically relevant information regarding the Italian AI epidemics. Thereafter, a statistical-epidemiological analysis of these data was carried out, focused on (1) risk factors for introduction and spread of AI, and (2) spatial and time depending dynamics of the spread of the AIV and the effect of prevention and control measures.

WP7: Epidemiological analysis of the Dutch data on AI.

Together with WP6, the development of a common analysis framework and approach to be used by was carried out. This was followed by a database development from disease control data of epidemiologically relevant information regarding the Dutch AI epidemic. This database was statistical-epidemiological analyzed, focused on (1) risk factors for introduction and spread of AI and (2) spatial and time depending dynamics of the spread of the AIV and the effect of prevention and control measures. Moreover, research was integrated in other projects which included transmission experiments with AIV to obtain important information regarding on-farm and between-farm transmission of AIV.

The methodology used within Task B included (1) data collection from various veterinary and epidemiological sources, (2) integration of the various data into useable databases, (3) statistical-epidemiological analysis and (4) transmission experiments.

The main deliverables of Task B were:

- An epidemiological analysis of Italian data on AI;
- An epidemiological analysis of Dutch data on AI.

1.3.3. Task C: Definition, epidemiological and economic analysis of strategies for prevention, monitoring and control of Avian Influenza

Task C focused on analysis of decision making options with regard to prevention, monitoring and control of AI, and included four WPs.

WP8: Qualitative regional risk assessment for AI.

Within this WP, the GIS-based toolbox developed in WP5 was extensively used, focused on a descriptive analysis poultry regions within the EU regarding qualitative risk assessment on introduction and spread of AI. The aim was to identify regions with higher respectively lower risks for introduction and spread of AI.

WP9: Economic analysis of monitoring systems for AI.

This WP focused on modeling monitoring of AI, with the aim to identify key-factors for improvement of monitoring systems, both from an epidemiological and economic point of view.

WP10: Epidemiological and economic modeling of AI to analyze prevention and control strategies.

Within this WP, data and information generated by various other WPs of the project was integrated in several simulation models, both epidemiological and economic ones. Various prevention and control strategies for AI were analyzed on their epidemiological and economic impact in various situations (e.g. poultry density, control measures and measures for economic mitigation of the AI impact).

WP11: Development of integrated monitoring, prevention and control strategies for AI.

Within this WP, the knowledge generated by the project was assembled, aimed at formulation of guidelines for future prevention and control of Avian Influenza. Within Task C, the main methodology used was (1) descriptive and qualitative analysis using the GIS-based toolbox, and (2) epidemiological-economic simulation modeling using integrated computer models. With regard to the latter, data was obtained from various sources, both within and outside the project.

The main deliverables of Task C were:

- An analysis of monitoring systems for AI;
- A qualitative regional risk assessment for AI;
- An epidemiological-economic analysis of prevention and control strategies for AI;
- The provision of guidelines for management of AI.

1.3.4. Organization of the report

The scientific output of the three Tasks is described in detail in various chapters. Each chapter has a specific, well-defined focus respectively research question, which is elaborated and described. Subsequently, a general discussion of the entire project is presented, including a summary and overview of the main results and conclusions.

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