Animal Health Data Comparison – two EADGENE sub projects

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Abstract

Emerging a nimal h ealth related is sues a nd imp roved a nimal health ma nagement r equire s ufficient comparable data. In the EADGENE [a] Health Data Comparison Project a pi lot study i ndicated that, both across Europe and between species, animal health data collection is fragmented and lacks harmonisation. The systems were desi gned i n order to meet the needs of veteri narians authori ties. For cattl e t he requirements from farmers were hardly taken into account. However there are structures and systems in place that contain very valuable information, if it were possible to access and consolidate these data on the European and/or species level. This would create a significant increase in the quantity and quality of the already collected and stored data. At two workshops the knowledge and technical input from experts of di fferent bodi es de aling wi th subjects of ani mal heal th da ta col lection on noti fiable di seases was brought tog ether. They made cl ear there i s add ed va lue fo r a ll s pecies t o b uild a nimal h ealth data systems but wi th d ifferences betwe en speci es on implementation and appl ication. Therefore sp ecies specific wo rking g roups we re s et-up t o d efine t he wa y fo rward. F or a ll sectors in volved t here is a n interest in the development of better coordinated systems for animal health related data. This can only be obtained by good involvement of stakeholders from the start wi th a bottom-up approa ch. Small pilot studies can show the benefi ts and can be expanded up to European wi de harmonisation of animal health related da ta – among the key factors of a cattl e pi lot project i s the i mplication of the most advanced systems in EU.

Keywords: Data comparability, animal health, disease, standardisation, harmonisation, breeding, research, European Animal Disease Genomics Network of Excellence.

1.0 Introduction

The international availability and comparability of animal health data is important for various reasons - animal move ment and h ealth data are a key so urce of i nformation in th e effecti ve management of disease prevention and outbreaks, but also progress in animal breeding and management, and research related to animal health will depend on the availability and comparability of data.

The impact of epidemic livestock diseases can be devastating on farmers and the economy as a who le – in a speci fic country, a continent or even gl obally. In 2007, the European Commi ssion l aunched the Animal Health Strategy for the Europ ean Union (2007-2013) (European Commission, 2007) striving for increased col laboration between EU m ember states to increase the prevention of ani mal health rel ated problems before they happen and to be ready to manage outbreaks and crisis more effecti vely, but also to i mprove economi c growth, cohesion and com petitiveness assuri ng free ci rculation of goods and appropriate animal movements.

For plans to gradually improve the availability and comparability of animal health data, studies into the feasibility of maki ng the coll ection o f animal heal th data are therefore of great i nterest. Thi s paper describes the two pilot projects, that have been undertaken in the framework of the EADGENE Network of

Excellence (EADGENE, 2004-2010), and design the set up of the required / possible follow up phase. In particular, the work of the cattle working group of Phase 2, and the proposals for the future are highlighted. Furthermore, this paper includes examples of similar work undertaken outside the European Union.

2.0 Methodology

The first pilot (Phase 1, 2007-2008) has provided an overview on the current status of animal health data collection and recording systems in cattle, pigs and poultry in four EU countries, namely: Denmark, France, Netherlands, United Kingdom. The second pilot (Phase 2, 2009-2010) has included mainly stakeholder consultation in two workshops, the preparation of plans for the next phase (Phase 3), and mapping of animal health data recording in a few extra countries (for cattle: Portugal, Italy, Spain (pilot: Basque Country).

2.1 Phase 1 – Mapping Data Systems in Pilot Countries

A project team has designed a plan for interviewing key persons and mapping of animal health data recording systems on cattle, pig and poultry in four pilot countries: Denmark, France, Netherlands, United Kingdom. They have gathered information on the different animal health data collection and recording systems within each country by means of informal interviewing process. An initial broad overview of the recording systems within each country has been developed through literature searches and preliminary interviews with a small sample of people. Further Interviewee's have then been chosen with the aim of gaining more detailed knowledge of recording systems in areas that were identified as being important in the initial overview. Discussions were held with a large number of people including representatives of Government departments, Government agencies, academics, animal scientists, veterinarians and industry organisations. The process conducted concurrently in each country and species by different members of the project team and took place between January and September 2008.

Due to the diverse range of different recording systems being considered, a fixed set of questions for all interviews could not be developed. Instead, a list of important aspects to cover as part of each interview was developed in the preliminary stages of the project and then used as guide by each interviewer.

Following the preliminary interviews, draft overviews of the recording structures within each country were developed. These draft overviews along with the project summary were then circulated to the interviewee's prior to the interview being conducted with the aim of aiding the discussion within the interview. A written report was put together after each interview which was then sent to the relevant interviewee for verification. After completion, information from all interviews were complied into individual country reports and final diagrammatic overviews of the health recording structures for each species within each country, which provided the information content for the report.

2.2 Phase 2 – Stakeholder Consultation and Species Specific Plans

Based on the recommendations of Phase 1, it was decided to base Phase 2 around two workshops with stakeholders. The project team prepared several documents which were used as input for Workshop 1 in Brussels. A broad range of stakeholders was approached to attract interest for this workshop. The Brussels workshop contributed essentially to the project design as it made clear that there is added value for all species to build animal health data systems but with clear differences between species regarding the way of implementation and of application.

Based on this important result of the first workshop, it was decided to set up species specific working groups, guided by the project team experts. These species working groups had numerous telephone conferences where they were brainstorming about possible ways forward. It was also important to get a general national overview for each species. It was decided to propose the participants to voluntarily set up additional country mapping diagrams as in Phase 1. This input plus the results of questionnaires, which were elaborated and sent around amongst participants of the first workshop plus stakeholders, were used to prepare Workshop 2, which was held on 15 October 2009 in Paris. At this workshop the working groups on cattle, pig and poultry presented their outline proposal for the phase after EADGENE funding, Phase 3. This paper highlights the work of the cattle working group.

At the two workshops the knowledge and technical input from experts of different bodies dealing with subjects of animal health data collection on notifiable diseases was communicated in order to create the best information amongst participants on existing schemes, especially on notifiable diseases. Representatives from the following organisations contributed by presentations: DG Sanco, OIE, CopaCogeca, ISAH and ICAR.

3.0 Results

The first project has allowed to establish a general framework which could be used to describe the different national situations in the same way. It has identified the major data providers and key players in the collection and recording of animal health data in the four pilot countries, and has distilled a general diagram that can be used across species and across countries, to enable comparison of the systems in a bird eye's view. The results of two stakeholder workshops are being described, and the proposal of the cattle working group. The interest for animal health data is not limited to Europe. For instance, in Canada, was implemented a large system which allow dairy farmers to record health data for their own management and for other purposes.

3.1 General Description of Data Collection and Recording

The increased risk of epidemic spread of diseases caused by the freedom of livestock movement is acknowledged within the EU. This has lead to a number of legislations which have an important bearing on the recording of health traits in animals across all member states within the EU: legislation on identification, tracing of movements, food hygiene and safety, the animal disease notification system, zoonoses control and disease eradication programmes.

EU legislative requirements often differ between species and this can account for important differences between the respective national recording systems. Movement documents, referred to as Passports, which include details such as the animal identification number, owner and mothers identification details, are also required to be issued with the aim of improving traceability. For pigs and poultry individual identification and passports is currently not a legislative requirement.

Given the need to meet the legislative requirements, it is not surprising that in pulling together the overviews it became clear that there are a number of similarities between the recording structures for different species and across the four different countries. A diagram showing the common elements of the different recording structures is shown in Figure 1. Specific diagrams for cattle in each of the four countries plus two extra countries mapped in Phase 2 can be found in Figures 2, 3, 4 and 5.

An overview of the major data collection and recording parties in the four pilot countries and their particularities of Phase 1 is given in chapters 3.1.1., 3.1.2, 3.1.3 and 3.1.4.

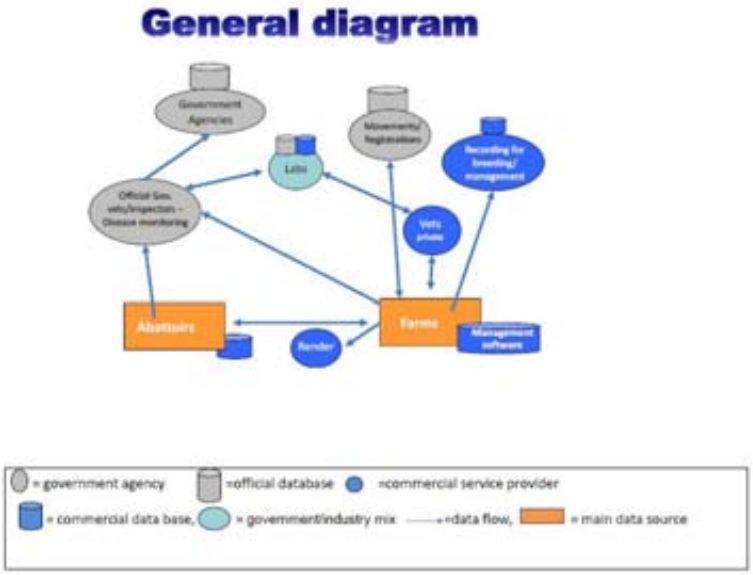

Figure 1. Description of animal health data recording systems

3.1.1 Data Collection and Recording Parties

The major Data Collection and Recording Parties in the four pilot countries of Phase 1 are:

Farms and Abattoirs.

- *Data recording on Farms* In all instances, the main sources of data were farms and abattoirs. Other than a health and movement register, any additional recording by producers themselves is done on a voluntary basis and therefore the level differs between specific farms within a country.
- *Data transfer between farms and abattoirs* The main transfer of animal health data from farms to abattoirs is done to meet EU requirements on Food chain Information (FCI).
- *Data recording in abattoirs* Much of the health recording in abattoirs is done by outside organisations, primarily associated with government agencies.

Government Agencies – Disease monitoring Within each of the four countries, government agencies play an important role in meeting EU legislative requirements with respect to food safety, disease monitoring and eradication for notifiable and other diseases of interest.

Laboratories Within each country there are two types of laboratory services; those mainly funded from public (government) sources, and others which are mainly funded through the provision on services to private clients.

Private Veterinarians Private vets are those that are generally provide a commercial service farmers or breeding companies. However on some occasions they can also act as official veterinarians being licensed to conduct work on behalf of a government agency.

Recording for breeding and management

Other organisations Other organisations involved in recording animal health data are: renderers, inseminators and hoof trimmers, Groupement de Défense Sanitaire (France), Farm Assurance Schemes.

3.1.2 Recording for breeding and management

Animal breeding is concerned not only with production characteristics such as growth and number of offspring, but also in structure and conformation of animals and their health to adapt their gene make-up to production constraints and as indicators of longevity. In cattle somatic cells counts (an indication of mastitis) and calving ease are also recorded.

Animal Movements and Registrations

- *Registration of animal holdings* To meet EU regulations, all keepers with stock above a certain number (e.g. with more than 50 birds for poultry in the UK) must register their

holdings with the relevant registration organisation. In all four countries this function is performed either directly by a government department of by a government agency.

- *Animal Movement tracking* Since 1999, to meet EU regulations, all EU member states are required to have a computerised tracking system for animal movements for cattle.

3.1.3 The Role of Government Departments and Levi Boards

Within each of the four pilot countries of Phase 1, responsibilities for different recording activities ultimately fall either to government departments, levy boards or commercial organisations.

Governments have adopted a variety of approaches. In Denmark there are relatively few Agencies, whereas in the UK there are a number. In The Netherlands GD is an example of a private company performing a number of roles that in other countries are performed by government Agencies. Levy Boards (termed Product boards in The Netherlands) exist in the UK and The Netherlands, but not in France and Denmark. Their remit is statutory in both countries, however the Product Boards in The Netherlands can also lay down binding regulations that apply to the sector concerned. In both countries the Product Boards are increasingly involved in the management of animal health data, zoonoses recording and reporting and Food Chain Information (FCI).

3.1.4 Data Ownership

Data ownership generally lies with the provider, however often access to grouped, averaged and trend data to provide benchmarking is agreed to by the data provider. Animal health data is a relatively small subset of the total data in the animal sector. Across countries predominantly in the poultry sector there is data transfer between farm, abattoir and feed mill to optimise economic performance. This data is generally not in the public domain.

3.2 Testing the Waters - Stakeholder Input

The study on the animal health data systems (Phase 1) indicated that, both across Europe and between species, animal health data collection is fragmented and lacks harmonisation. However the study also indicated that there are structures and systems in place that contain very valuable information, if it were possible to access and consolidate these data on the European and/or species level. This would create a significant increase in the quantity and quality of the already collected and stored data.

Based on the recommendations of Phase 1, it was decided to base this Phase 2 mainly around two workshops with stakeholders. At the two workshops the knowledge and technical input from experts of different bodies dealing with subjects of animal health data collection on notifiable diseases was communicated in order to create best information amongst participants on existing schemes, esp. on notifiable diseases.

The workshops made clear that there is added value for all species to build animal health data systems but with clear differences between species regarding the way of implementation and of application. This means that a common approach for all three species is not feasible. Therefore species specific working groups were set-up with members from several countries and institutes which defined the way forward.

3.3 Cattle Working Group

The voluntary participants in EADGENE cattle working group had to define, whether it is worth constructing a European project of Health Data Management for the cattle industry. This work made clear that animal health issues, both notifiable as described in the corresponding legislation and non-notifiable, are important and could have real benefits for all stakeholders.
In several EU member states, information systems dealing with notifiable and non-notifiable diseases in cattle do already exist (For examples see Figures 2, 3, 4 and 5).

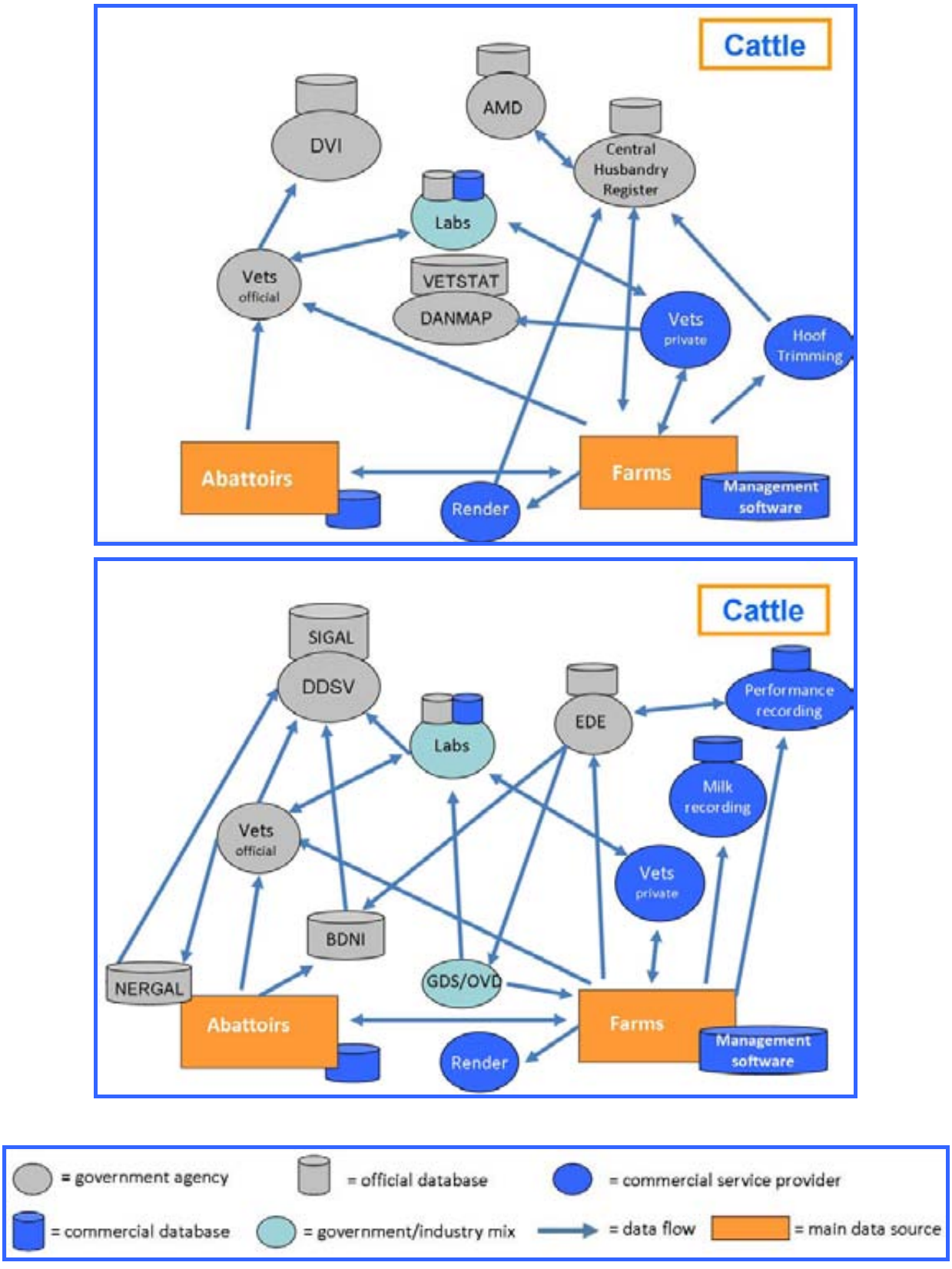

Figure 2. Description of cattle animal health data recording systems for Denmark and France

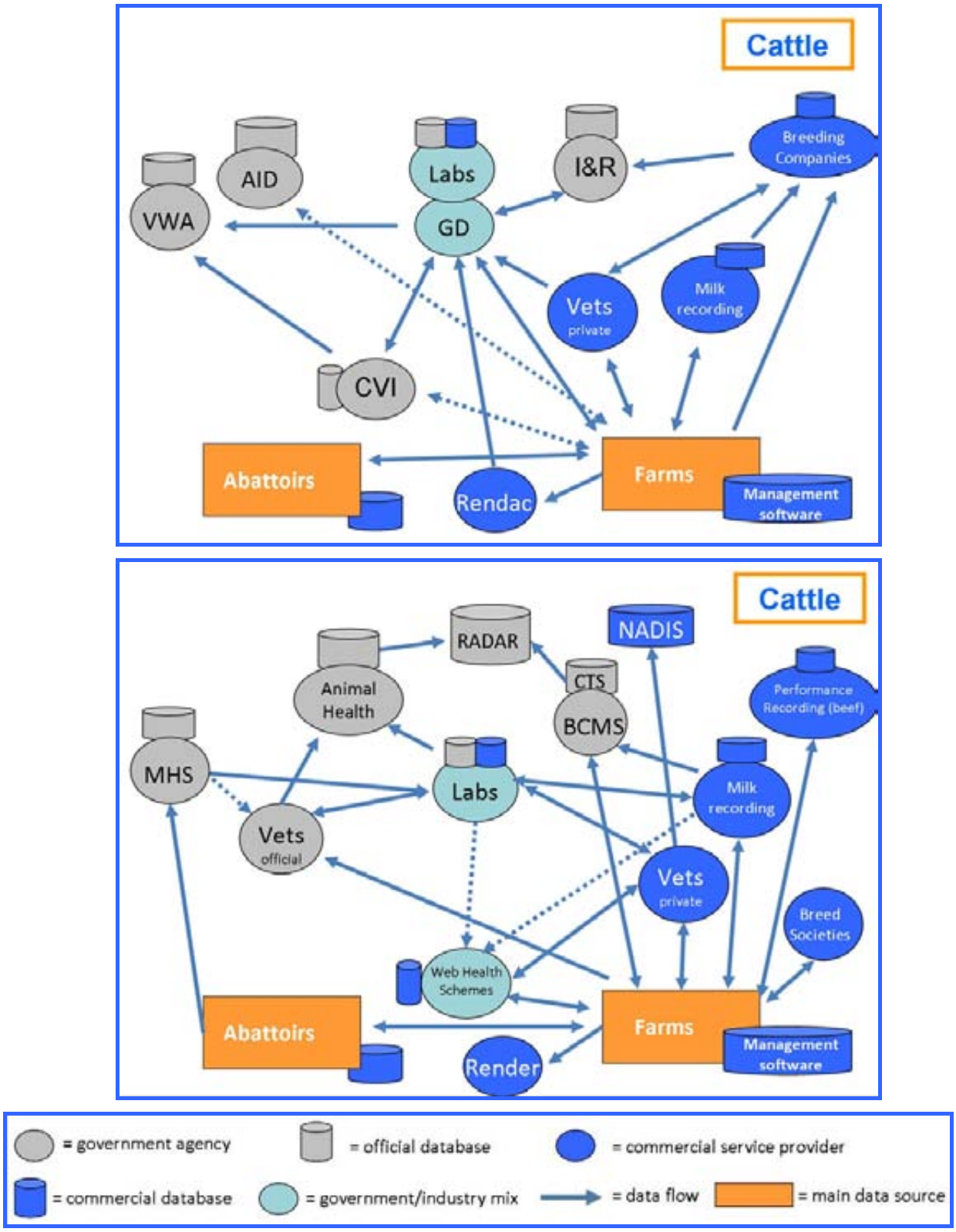

Figure 3. Description of cattle animal health data recording systems for the Netherlands and the United Kingdom

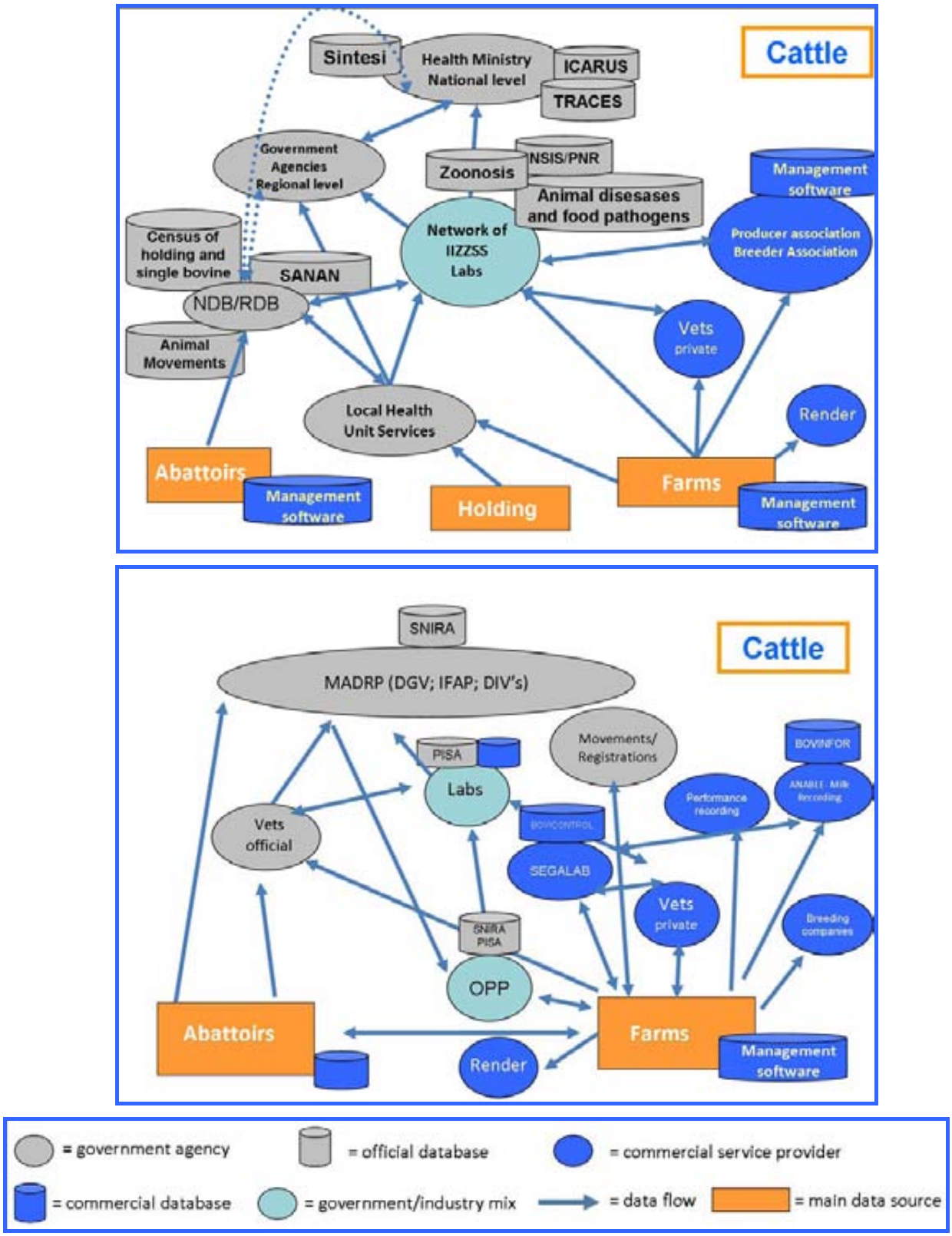

Figure 4. Description of cattle animal health data recording systems for Italy and Portugal.

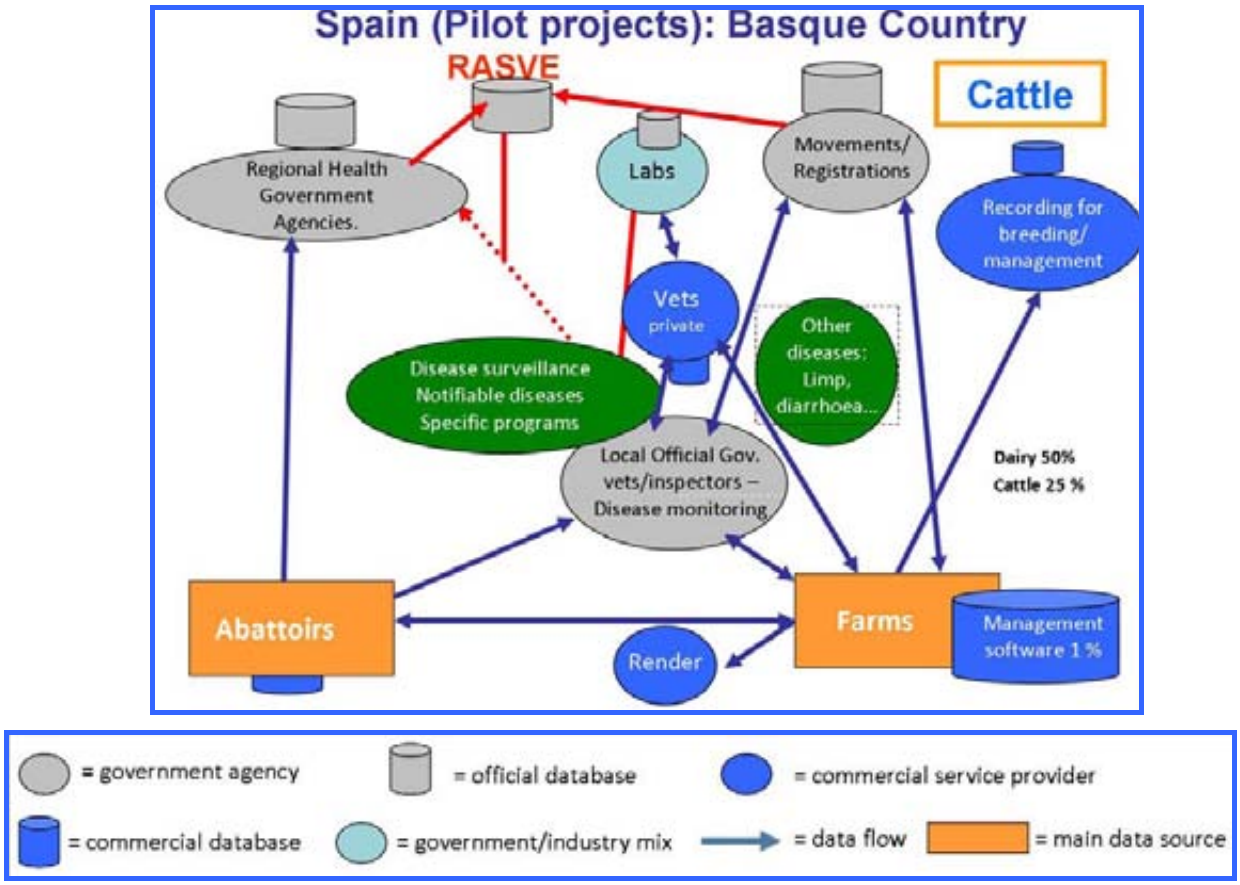

Figure 5. Description of cattle animal health data recording systems for Spain (pilot: Basque Country).

3.3.1 Importance of Non-Notifiable Diseases

The government implication is focused on the contagious diseases within animals or between animals and human beings. It results in an obligation to notify these diseases to the public authority. Fortunately, these diseases which have a major economic impact are rare. Besides these notifiable diseases, there are many other non notifiable disease which have real impact for all stakeholders working in cattle production:

On animal production profitability.
Technical-economical results of farms are linked with animal health. It complements the other factors determining animal performance : genetics, feeding, husbandry system or management.
On the amount of work for breeders.
Sanitary problems on farms lead to increased time spent in animal care and vigilance.
On animal welfare, e.g. lameness.
Human health concerns: less disease result in less medicine, and mainly less antibiotics.

There are real needs from the farmers' point of view for:

Advice in health monitoring for a herd or for each animal,
Improvement of sanitary best practices,
Help in reproduction/mating strategy, in linkage with animal selection and genetics,
Alert before the outbreak of diseases.

Non-notifiable diseases could also be a key factor for the discovery of new transmissible factors for genetic evaluation or genomics.
From a veterinary perspective, it will also be possible to make epidemiologic studies in cattle populations.

3.3.2 Added Values for All Stakeholders

All partners involved in animal management and husbandry, genetics or animal health can identify real benefits in cattle health data provision, management and analyses:

For farmers, it will contribute to the identifying of potentials for economic improvement,
For veterinarians, it will be a tool which would develop coordinated actions in prevention and treatment of diseases,
For advisory services, breeding or recording organisations, it will be a basic requirement to have information about the health status of farms and animals, to share knowledge between stakeholders and to have a common vocabulary,

For research, there are applications in genomics to explore, especially since there is the existing EADGENE Network, working on links between animal health and genomics.

3.4 Global Developments

Agriculture and Agri-Food Canada (AAFC, http://www.agr.gc.ca/index_e.php) provides information, research and technology, and policies and programs to achieve security of the food system, health of the environment and innovation for growth. They have undertaken a national animal health project to gather data on eight key diseases to improve the management and economy at farm level. The partners in animal health improvement, among others the artificial insemination centers, the breed associations, and the veterinarians, have initiated this project in the course of 2006 with the aim to improve the production of selection indexes. The diseases are milk fever, left displaced abomasum, cystic ovarian disease, clinical mastitis, retained placenta, metritis, ketosis, lameness.

AAFC has a history of gathering public animal health data – in poultry already since 1999 animal health data have been gathered on e.g. 32 diseases (*www.agr.gc.ca/poultry/condmn_eng.htm#chicken*). At the Economic and Market Information section, a Poultry Market Place section gives access to all the data that are being delivered in the excel file with data and graphs of Canadian poultry health and production data over time. They have also been made available to the European Food Safety Authority working groups that are looking into the developments of broiler welfare and genetics over time. They show considerable improvement in broiler health over time.

4.0 Discussion

The design of animal health data collection, storage in a database and usage has often been designed with a single purpose in mind. In many countries there are separate databases that require multi data entry of the same or similar information. Usage by a variety of audiences has not been taken into account in the design. The connection or links between the various databases have historically not been a priority. Part of this has been lack of foresight and lack of a different perspective and that information has been considered proprietary.

People, organisations, companies and government are realising the benefit of simple single data entry of information, of the benefit of connected data, the benefit of varied usage.

The current technical status of computing and of the technical skills in computer use enable greater benefit than has been possible previously.

The various stakeholders, throughout the food chains in Europe, with their varied needs of animal health data are increasingly aware of the need for accurate, interoperational and accessible information.

The diagrams in the Phase 1 project report indicate substantial variation, both between the countries and the species analysed. This variation can be explained historically to some extent, such as differences in requirements between species and countries and in the structure of the animal production of each country. In addition differences in consolidation between the structure for cattle, pig and poultry have been equally important drivers. It can be expected that the species specific drivers will grow further in dominance over the national drivers.

4.1 Cattle

Once having defined all the interests of a European common project, it seems important to discuss the key issues for success.

One of the main factors used to define the scope of the activities included in the project is animal diseases. As described in the previous paragraph, there are a large number of non-notifiable diseases in cattle production. The question arises: which one to start with?
The idea accepted by the group is to set up a general framework which can be used for any disease. It would allow pro-action when there is a new disease to deal with. There are systems already existing in human health.
However, it seems important to identify pertinent diseases that could serve as examples to define a common structure of data. The following relevant diseases in cattle were identified: Mastitis / Lameness / Bovine hypodermosis (warble) / BHV1(IBR/IPB) / Paratuberculosis / Pneumonia / Diarrhoea in calves.

The objective of the project would be to facilitate the implementation of:

Harmonised recording systems:
The definition of a precise methodology of data collection, with common procedures to be used by each actor involved – such as farmers, veterinarians or slaughtering houses – has to be given;
Harmonised architecture of data systems:
The aim is to define all the elements, which are necessary for a common structuring of data e.g. data dictionary;
Harmonised guides for best practices:
To enhance commitment of farmers and veterinarians, it is necessary to build a system which is able to identify and share knowledge and best practices amongst the actors in order to improve cattle health at farm level.

The major hurdle for such a project is early and strong involvement of stakeholders.
A return of information to all the stakeholders has to be a priority for success in this project. They must have a clear interest and get practical results in the short as well as in the long term.
A benchmarking tool is envisioned. Pilot farms with effective data collection systems will show the feasibility and continuity, the real interests of the animal health management system for cattle farmers.
The voluntary participants in EADGENE cattle working group had to define, whether it is worth constructing a European project of Health Data Management for the cattle industry.

5.0 Conclusions and Recommendations

The motivation for a species specific discussion as given in the previous chapters does also apply to the drawing of conclusions and the formulation of recommendations.

However, this should not be interpreted that those concepts described in one of the following species specific paragraphs cannot be applied to other species. The initial drivers and objectives for this project as described in chapter 3 of this report are identical for all, as illustrated by the similarities of the country/species / disease dimensions of data collection in Figure 6.

There is no doubt, that future successful implementation of inter-operability in the field of animal health data collection and analysis will be dependent on the stakeholders involved. This stakeholder-base should be as comprehensive as possible. Any groups not involved in the preparation of this report and interested in the topic are invited to join.

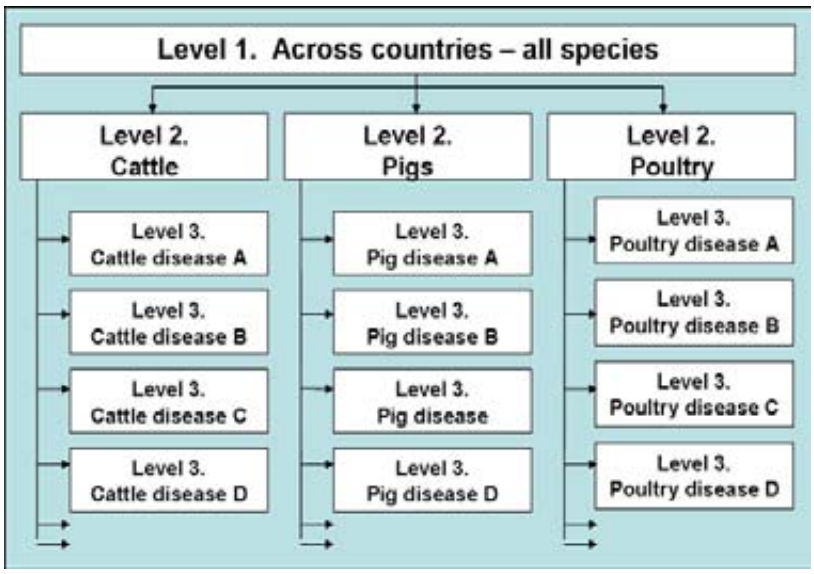

Figure 6. Illustration of the similarity of the country/species/disease dimensions of data collection.

5.1 Cattle

Phase 2 of the EA DGENE AHDC project allowed the preparation of a concrete project which will improve the analysis of cattle health data to create more added value for the stakeholders. It was only possible with the input from other countries, with new country mapping realised and a real commitment in the project.

There are several projects that will be launched or are about to be launched in the EU and elsewhere. There is a real interest at international level to deal with this issue.

For cattle, a specific working group was set-up. The conclusion from this was that there are several opportunities existing for European cattle production to share animal health data to improve farming practices. To achieve this, it is necessary to harmonise both recording systems and systems of data analysis.

A general overview of the project could be based on an approach with an existing method schematically represented in Figure 7.

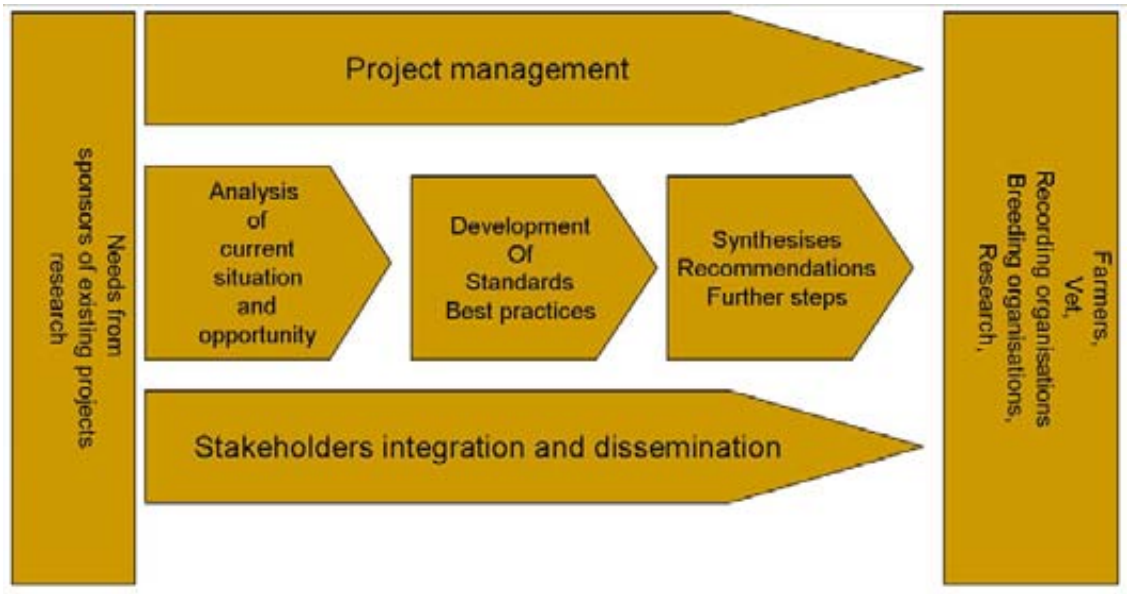

Figure 7. Schematic presentation of a general overview of the project for cattle.

The project concept would be divided in three big steps:

1. Analysis of current situation and opportunity.
   In this step, we have to define precisely the procedure : who and how to get the data.
2. Development of standards and best practices.
   The aim is to deliver a guide of best practices to implement the standards.
3. Provide recommendations and definition of further steps.
   The final work is to get all the elements that ensure the strong involvement of stakeholders.

The realisation of the cattle project could be achieved in two years. Limited objectives, a specific a funding, limited number of participants and the implication of the most advanced countries are the key issues for this kind of project.

As a conclusion it may be stated, that a general lay out of a cattle project is progressing. It will require substantial involvement of European and if possible global stakeholders to reach our objective of cattle health data management and exchange. Phase 2 of EADGENE Animal Health Data Comparison (AHDC) has already achieved an important step : to federate a small but motivated group possessing relevant technical elements and ready to proceed. It is time for the next step: preparation and funding of the Phase 3 project – this could be the job for a stakeholder wide dedicated working group. It would be preferable if this working group could work under/with the remit of the major cattle recording body/bodies.

6.0 Acknowledgements

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7.0 References

Aumüller, A., Bleriot, G., Neeteson, A.-M., Neuteboom, M., Oostenbach, P., Rehben, E., 2010. Animal Health Data Comparison. Recommendations for the Future. February 2010. 20 + 40 pp. www.eadgene.org

EADGENE, 2004-2010. European Animal Disease Genomics Network of Excellence. Network of Excellence supported by funding under the 6th Research Framework Programme (EU Contract No. FOOD-CT-2004-506416) of the European Union European Commission. www.eadgene.org

European Commission, 2007. A new Animal Health Strategy for the European Union (2007-2013) where 'Prevention is better than cure'. http://ec.europa.eu/food/animal/diseases/strategy/animal_health_strategy_en.pdf

Malafosse, A., Van der Sanden, A., Jones, G., Jones, H., Hoste, S., 2008. Project Report EADGENE Data Comparison. October 2008. 89pp. www.eadgene.org