

Animal Health Australia's National Animal Health Information System: A Web-Based System For The Submission, Analysis And Display Of Australian Animal Health Data

Hutchison, JM¹; Langstaff, I²; Citer, L³; Brodie, R⁴; Cameron, AR⁵; Madin, B⁶; Sergeant, ESG⁷

¹ AusVet Animal Health Services Pty Ltd; jenny@ausvet.com.au

² Animal Health Australia; ilangstaff@animalhealthaustralia.com.au

³ Animal Health Australia; lciter@animalhealthaustralia.com.au

⁴ Animal Health Australia; rbrodie@animalhealthaustralia.com.au

⁵ AusVet Animal Health Services Pty Ltd; angus@ausvet.com.au

⁶ AusVet Animal Health Services Pty Ltd; ben@ausvet.com.au

⁷ AusVet Animal Health Services Pty Ltd; evan@ausvet.com.au

ABSTRACT

The timely availability of accurate and appropriately presented animal health data supports a country's animal health status internationally, and provides a foundation for decision-making by animal health authorities. The processes of collating, checking, analysing, summarising and achieving appropriate approvals of nationally relevant animal health data can be time consuming, labour intensive, and prone to error, all of which can make it difficult and expensive to achieve timely and appropriate reporting. In Australia, Animal Health Australia (a not-for-profit public company established and funded by the Australian, state and territory governments and major Australian livestock industry organisations) manages the National Animal Health Information System (NAHIS). This paper describes the NAHIS, a sophisticated, flexible, web-based system designed to support Australia's animal disease surveillance programs by providing online submission of nationally relevant data, with automation of data analysis and summarisation, and provision of customised output reports.

KEYWORDS

animal health information system, database, surveillance

INTRODUCTION

Animal Health Australia's National Animal Health Information System (NAHIS) was launched in January 2006 and now houses data accessed by three separate animal disease surveillance program applications: NAHIP (National Animal Health Information Program), NAMPIInfo (National Arbovirus Monitoring Program), and EDIS (Endemic Disease Information System). Prior to incorporation in NAHIS, data from these applications were maintained in separate databases that had functioned very well for many years but were relatively inflexible and becoming less able to meet changing information and reporting needs.

The NAHIS uses the Central Animal Health Database (CAHD) to manage data from its integrated web accessible animal health and ancillary applications (Figure 1). The key software components of the NAHIS are the operating system (Windows server operating system), web server (Windows IIS web server), database management system (Microsoft SQL server database management system), web scripting language (PHP), web mapping server (MapServer), statistical analysis and graphics software (R), and wiki (PmWiki). The technical features of NAHIS are described in the companion paper *Managing Cost and Promoting Sustainability in an Animal Health Information System: Technical Aspects of Animal Health Australia's National Animal Health Information System* (presented by AR Cameron). Details of the ancillary wiki application are discussed in the companion paper *Customisation of a wiki for Animal Health Australia to provide secure external collaborative online document development and to act as an online repository for non-public animal health program information* (presented by JM Hutchison) and the information sheets ancillary application is the subject of a poster *A web-based system for ongoing maintenance of Animal Health Australia's information sheets for animal diseases* (by R Gordon).

ANIMAL HEALTH PROGRAM APPLICATIONS

The NAHIS was developed to allow the addition of new animal disease surveillance program applications (ADSPAs), as needed, without extensive reprogramming. All ADSPAs managed by the NAHIS use the same underlying database (CAHD), yet maintain separate, distinct web interfaces. Each ADSPA has some material that is available to the general public (unauthorised users): the NAHIP application provides selected summary national animal health data and disease information sheets; NAMPIInfo provides the official

interactive bluetongue zone map; and EDIS has a searchable register of herds and flocks in the Australian Johne's disease Market Assurance Programs. However, most of ADSPA pages and data are restricted to authorised NAHIS users who must log in using their assigned log-in name and password. Within each ADSPA, data managed by the CAHD is presented to the user as one or more (virtual) tables, each of which is known as a 'project'. Each project contains data related to a particular disease, condition, or event of interest.

User management and access levels

User details recorded in the CAHD include basic contact information, ADSPA access permissions (identity of ADSPA, level of access and user role, projects to which access is provided), mailing list information (identity of subscription, type of subscription (email notification or hard copy), number of hard copies to be received), wiki access permissions, and NAHIS password (encrypted).

Access levels are developed for each ADSPA based on animal health program business rules and needs. Access levels determine the extent to which an authorised user can view or manipulate (submit, delete, edit) data, run custom-built queries, manage their own or other users' personal details, manage database features, or work with mailing lists.

For example, users with 'contributor' access to the NAHIP application can view and manipulate all data submitted to their projects for the jurisdictions to which they have been assigned. They can view only the summarised data from other jurisdictions and this only after the data has been flagged as validated. In contrast, a user with 'technical coordinator' access to the NAHIP application has no ability to manipulate any data but is able to view detailed and unvalidated summary data from all jurisdictions. Common to all ADSPAs is an 'administrator' access level with all privileges enabled.

Project management

A feature of the NAHIS is that the number, characteristics, and outputs of projects within each ADSPA are not hard coded but are managed by a user with 'administrator' access. This means that animal health programs can respond quickly and economically to most changes in information needs and reporting. New projects can be added, or existing ones modified, without the need for expensive programming input.

Data submission, modification, deletion

Contributors prepare for the online submission of their data by collating project information in a spreadsheet. The first row contains the project identifier, the second the column headings, with subsequent rows containing the project data. Data is submitted by copying the header rows and data block from the spreadsheet and pasting them into a blank text box on the ADSPA's data submission page. Submitted data is screened by the database prior to acceptance; any data block containing invalid, missing or out-of-range data is rejected in total, with detailed error messages provided to the contributor. Data that meets the project requirements is accepted, and contributors are immediately provided with the opportunity to view their submitted data. Upon successful submission, data can be viewed (depending on user access) as entered, or summarised according to the reports that have been prepared for that project.

Project fields are designated as 'optional', 'compulsory' or 'key'. A project's combination of key fields is used to identify a record as unique; a record submitted with key fields identical to those of an earlier submission is seen not as a new record but as an update of the previous submission. This feature provides an efficient means of updating or revising data. Contributors are able delete data, but 'deleted' data is not physically removed from the database. Instead, it is archived and can be viewed and 'undeleted' by an administrator if required. A log is kept of all CAHD submissions regardless of outcome. This is most useful when troubleshooting reasons for an unsuccessful submission, as the administrator is able to extract and inspect the data actually submitted by a contributor.

Production of output reports

Administrators have access to a wizard-like utility that enables them to design ADSPA project output reports. Reports can be tables, graphs/charts, or maps. A project can have any number of summary reports. Most reports can be handled via the wizard-like utility. However, on occasions, more complex reports are required. These can be developed by editing the underlying code, but this does require some specialised knowledge. In the NAHIP application, reports can be designated to: 1) be visible to the public (i.e. for viewing without database log-in privileges, e.g. <http://www.animalhealthaustralia.com.au/nahis>); 2) be visible within the ADSPA to all authorised users; 3) appear in the 'AHSQ download' (AHSQ: Australia's *Animal Health Surveillance Quarterly* report); or 4) any combination of these. All 'AHSQ download' reports are saved to a spreadsheet in the order in which they are to appear in the AHSQ report, complete with the captions, footnotes and accompanying text; no additional manipulation of data in these tables is performed. This

allows the contributors and reviewers to easily view summarised data and assists in accurate transcription of the downloaded data into the AHSQ.

ANCILLARY APPLICATIONS – MAILING MANAGER

The mailing manager ancillary application manages the mailing lists of Animal Health Australia publications such as the *AHSQ*, the *Animal Health in Australia* annual report (AHIA), the NAMP annual report, and *JD News* (Official Newsletter of the National Johne’s Disease Control Program). A feature of the application is its bulk upload facility for mailing information, which includes reasonably sophisticated analysis of name and address information to reduce (but not completely eliminate) the potential for duplicate mailings. Mailing lists for printed copies or email notifications can be downloaded, or mail merges can be performed by direct connection to the database.

CONCLUSION

The NAHIS provides maximum flexibility to accommodate changes and additions to applications, projects and reports with minimal need for expensive code changes, and is a valuable and accessible repository of Australian animal health information.

REFERENCES

- MapServer: <http://mapserver.org/>
- PmWiki: <http://www.pmwiki.org>
- MS SQL Server: <http://www.microsoft.com>
- PHP: <http://www.php.net>
- R statistical environment: <http://www.r-project.org/>

ACKNOWLEDGMENTS

Animal Health Australia company member and animal health stakeholders who have provided feedback during the development and growth of the NAHIS and associated applications are gratefully acknowledged.

Software components

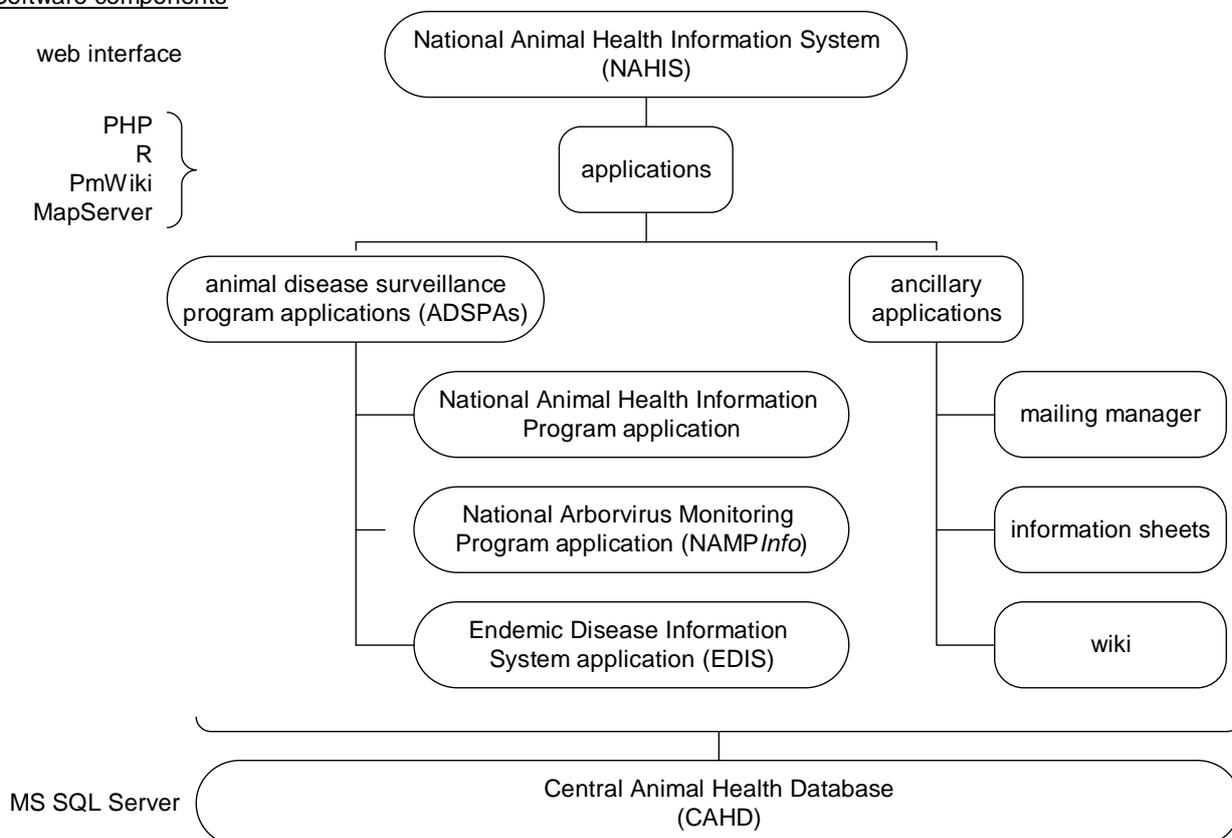


Figure 1 Structure of Animal Health Australia's National Animal Health Information System