Minimum Dataset for Animal Health Surveillance Update

Mid-project Report

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This work is an initiative of the Canadian Animal Health Surveillance System (CAHSS), a division of Animal Health Canada.

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Background

A minimum dataset for animal health surveillance (MDSAH) is a group of elements that are available for surveillance use. An MDSAH remains minimal and generally excludes identifying information, yet still includes sufficient data elements to generate accurate and useful information. **For laboratory data, the MDSAH is the subset of routinely generated laboratory data that is required to generate surveillance information of high value.** In 2011, an MDSAH for use of Canadian animal health laboratory data was published. Today, the Canadian Animal Health Surveillance System (CAHSS) is undertaking a project to determine whether there is a need to update the 2011 MDSAH, and if so, to determine what updates might be made. A one page summary of the project is provided in Appendix 1. The project goals include the following:

1. Update the minimum data elements for laboratory data in order to maximize surveillance value,
2. Evaluate opportunities and needs related to increased use of the genomics testing,
3. Foster interactive communication with the surveillance communities in Canada to encourage new ideas related to MDSAH and animal health surveillance.

Methods and Results

Throughout autumn 2021, the MDSAH project lead included interactive sessions with CAHSS network groups (species specific and special topics groups) and other surveillance partners. In addition, CAHSS met with an expert genomics group to examine how genomics data might be incorporated into animal health surveillance systems and activities.

During these consultations, we collected ideas for how the 2011 MDSAH might be updated. After the consultations, results were synthesized by the project team into the mid-project report.

During the next phase, we will be undertaking a second round of consultations based on the mid-project report. A survey has been prepared to accompany this report, and will be used to collect further information from surveillance partners. This may be used to prepare for a final in person meeting. At the project end, results of all activities will be incorporated into a final report and a manuscript for publication.

Review of 2011 core elements

Table 1 lists data elements included in the 2011 publication. During phase one interactive consultations with the Canadian animal surveillance community, the value of maintaining each of these data elements in an updated MDSAH was qualitatively classified as high, intermediate, or low by animal health surveillance stakeholder groups. In phase 2, we are asking stakeholders to review the classifications, and provide comments. Data elements in Table 1 are listed by classification, and then alphabetically. Examples are provided for context.

Table 1. Phase 1 surveillance stakeholder group classification of previous MDSAH elements as high, medium or low value for surveillance

HIGH				
#	Core data element	Definition	Considerations from surveillance group consultation	Examples
1	Animal species	Animal species from which the laboratory submission originates	Instead of animal species, should be changed to animal type to allow for appropriate nomenclature for non-production species	Aquaculture, wildlife, equine, companion, or agricultural terrestrial animals
2	Date submitted/ received	Date the sample was received by the laboratory is recorded by laboratories	Date received is dependably recorded by the laboratories as part of their tracking process/ quality assurance	MM/DD/YYYY
3	Disease agent	Organism or disease agent (e.g., fungal, bacterial, viral, other) tested for at the laboratory	For best interpretation, this should be combined with test performed and test result	Equine infectious anemia, Salmonella, Bovine coronavirus
4	Final laboratory diagnosis	Overall interpretation of laboratory diagnosis as assigned by the laboratory	Data element is often delayed. Allows validation of suitability of syndromic indicators as recorded by the submitter or derived from other information	
5	Geographic location	Location of animal or environment prior to submission	Premises ID, otherwise, data element could be postal code, forward sortation area (FSA), or regional municipality/county	BC449GP7N. N1G1R1, K1A
6	Test result	Result of the test at the laboratory	It is necessary to include enough information to allow for best test interpretation. For traditional testing platforms including PCR	Positive, suspicious, numerical value, other

			this is done by combining test performed, disease agent, and test result. In genomics this might be the gene, factor, or subtype identified	
INTERMEDIATE RANKING				
7	Number sick	Used as a risk variable to indicate severity of the clinical issue and to assess morbidity rates		
8	Number dead	Used as a risk variable to indicate severity of the clinical issue and to assess mortality rates		
9	Test performed	Category of test performed by the laboratory	Necessary to combine with disease agent and test result for appropriate interpretation. Different tests have different sensitivities or specificities, etc., but result may look similar in terms disease absence or presence	IHC, PCR, ELISA, FAT tests
LOW RANKING				
10	Disease classification by submitter	Classification by the submitter based on body system or primary signs	Surveillance group commented that this data element is not required if other element such as reason for test is included. Information derived from this data element can be extrapolated from other information on the submission	Submission of lung and trachea would indicate a respiratory syndrome

11	Farm type	Species-specific description of farm types by primary activity	Used with group type. May not be of practical use for non-production animals	Beef feedlot farm, beef cow-calf farm
12	Group type	Species-specific description of the production group sampled by submitter	Combines aspects of age, sex, and management of animals tested, but there are obvious species variations as well as regional differences. May not be of practical use for non-production animals	Dairy heifer, broiler breeder, racehorse
13	Total population of tested species	Denominator for prevalence and severity determination, enables estimation of surveillance completeness	Difficult to determine data element as often not the true "risk population"	

During consultations with Canadian surveillance groups in autumn 2021, some changes and updates to the 2011 minimum dataset were brought forward for consideration. In Phase 2, we are seeking feedback about the surveillance value and feasibility of these additions and changes.

Adjustments to existing data elements

Animal and submission identification

During the interactive sessions, many surveillance groups discussed the topic of identification and what system might work for all animal major sectors; production animal (including both production animals commonly managed as individuals and those managed as groups), companion animal and wildlife sectors.

Some points of discussions around identification included;

- Confidentiality
- Protection of submitter, owner, and producer identification including protection of location information that might allow for identification
- Difference in primary and secondary animal identification across different animal types;
    - For certain types of production animals (e.g., swine, bovine), primary animal identifier equates to the unique animal ID, and secondary animal identifier refers to the premises ID for the animal location,
    - For other types of production animals (e.g., poultry or aquaculture), primary animal identifier refers to the flock or pen, and secondary animal identifier refers to the premises ID in which the animals are housed,

- For non-production animals (e.g. companion, captive), primary animal identifier refers to the animal name, and secondary animal identifier refers to the farm geographical location,
  - For wildlife, primary animal identifier may be obtained by combining animal type, geographical location found, date collected and sometimes an animal tag, nickname or submitter ID.
- Challenges of current laboratory systems
  - Laboratory submission number may include multiple animals in a single submission number, or the same animal may be represented in multiple submission numbers, including over time,
  - Non-production animals are not affiliated with a premises ID,
  - Lack of standardized identification or unit of analysis.

Click here to access Survey Monkey Link to answer the following question(s):

Question 4: Do you have any comments on practices to manage animal and submission Identification across different animal classes (production, companion, wildlife)?

Animal type Instead of a single data element originally termed "animal species", it was proposed that animal type would be captured as a multi level element. Under consideration is a three-level element; Animal type 1, animal type 2, and animal type 3.

Animal type examples:

- Animal type 1 - list of broad categories such as companion, research, production, free living (wildlife), zoo/captive
- Animal type 2 – list of production type/ or life stage such as dairy, beef, grower pig, finisher pig, cat, dog, grower turkey, broiler chicken

- Animal type 3 – free text field to capture other information the submitter deemed important such as breed of the animal Holstein, Leghorn, Thoroughbred, Pacific salmon, domestic shorthair.

Click here to access Survey Monkey Link to answer the following question(s):

Question 5: How much would replacing 'animal species' with 'animal type 1,2,3' in the MDSAH increase surveillance value of laboratory data?

Question 6: How feasible is it to collect the proposed 'animal type 1,2,3' data in the MDSAH?

Question 7: Do you have any further comments on animal type as an element of an updated MDSAH?

New elements associated with animal and submission characteristics

Animal age This data element was discarded in the 2011 MDSAH original as age format was noted to often be variable and age was often difficult to obtain (i.e., intermittently filled out in laboratory submission forms). Animal age is less difficult to obtain in captive, companion, or production animals than in wildlife. Animal age can be captured numerically in days, weeks, months, or years at the time of submission. It can also be captured as broader categories of life stages. Age information could be used on its own, or together with animal type data (e.g., animal type 2) which could be valuable for test interpretation. Elements related to animal age and that could be used in lieu of animal age for production animals include animal type, farm and group type, or production status.

Animal age examples:

- Production (flock/pen): age represented in days, weeks, months
- Production (individual): age represented in days, weeks, months
- Companion: age represented in weeks, months, years
- Free-living/ wildlife: age represented in years if available
- Other (captive): age represented in years if available

Animal age as life stage examples:

- Abortion/ stillbirth
- Neonate
- Juvenile
- Young Adult

- Adult
- Geriatric

Click here to access Survey Monkey Link to answer the following question(s):

Question 8: How much would including animal age in the MDSAH increase surveillance value of laboratory data?

Question 9: Which do you prefer – age in weeks/ years, or life stage or option for both?

Question 10: Do you have any further comments on age as an element of an updated MDSAH?

Date collected – Date the animal or environmental sample is collected. This element may be used across different animal types and is particularly useful in wildlife and research where there may be a long lag time between sample collection and sample submission. Date collected and date submitted (date sample is received at laboratory) are both important data elements. Comparing date collected to date submitted can be used as a general data quality indicator as date collected should always precede or be equal to date submitted.

Click here to access Survey Monkey Link to answer the following question(s):

Question 11: How much would including date collected in the MDSAH increase surveillance value of laboratory data?

Question 12: How feasible is it to include date collected in the MDSAH?

Question 13: Do you have any further comments on date collected as an element of an updated MDSAH?

Reason for submission – Reason for submission might include the following broad category types: diagnostic/ clinical disease investigation, export or sale testing, research, surveillance in healthy animals. When laboratory data is used for surveillance, reason for submission would allow data related to clinical disease investigation to be interpreted differently from other categories. Other elements related to reason for test or submission include detailed history, a checklist of body systems affected or syndrome, comments on disease suspected, or tentative diagnosis.

Reason for submission category examples"

- Production (flock/pen): diagnostic, export/ sale testing, research, surveillance
- Production (individual): diagnostic, export/ sale testing, research, surveillance
- Companion: diagnostic, export/ sale testing, research, surveillance
- Free-living/ wildlife: diagnostic, research, surveillance
- Other (captive): diagnostic, export/ sale testing, research, surveillance

Click here to access Survey Monkey Link to answer the following question(s):

Question 14: How much would including reason for submission in the MDSAH increase surveillance value of laboratory data?

Question 15: How feasible is it to include reason for submission in the MDSAH?

Question 16: Do you have any further comments on reason for submission as an element of an updated MDSAH?

Sample type – Sample type includes individual, pooled sample, or environmental. This data element is becoming more relevant given the increased use of pooled samples and environmental samples.

Click here to access Survey Monkey Link to answer the following question(s):

Question 17: How much would including sample type in the MDSAH increase surveillance value of laboratory data?

Question 18: How feasible is it to include sample type in the MDSAH?

Question 19: Do you have any further comments on sample type as an element of an updated MDSAH?

Antimicrobial use **–** Antimicrobial use (AMU) data allows for better interpretation of antimicrobial resistance data. One proposed option would be to ask the submitter about the number of different antimicrobials used on the individual/ group within 30 days. Categories that the submitter could check off include "0", "1", "more than 1", and unknown. An additional free text field could collect more information.

Click here to access Survey Monkey Link to answer the following question(s):

Question 20: How much would including AMU data in the MDSAH increase surveillance value of laboratory data?

Question 21: How feasible is it to include AMU data in the MDSAH?

Question 22: Do you have any further comments on AMU as an element of an updated MDSAH?

History – History is routinely collected as a free text field on laboratory submission forms, however it was not included in the 2011 MDSAH in part due to challenges with storing and analyzing free text data.

Information in the history field is often specific to the circumstance, reason for submission and disease. It might include vaccination status, exposure to disease agents, previous and current treatment history with antimicrobials/ medications.

Click here to access Survey Monkey Link to answer the following question(s):

Question 23: How much would including free-text history in the MDSAH increase surveillance value of laboratory data?

Question 24: How feasible is it to include free-text history in the MDSAH?

Question 25: Do you have any further comments on free-text history as an element of an updated MDSAH?

Final diagnosis: Similar to history, final diagnosis is a routine free text field, however it is generated b the laboratory rather than the submitter. Again, it was not included in the 2011 recommended MDSAH in part due to challenges with storing and analyzing free text data. Pathologists use the final diagnosis field to share information with the submitter. This information may be valuable with overall test interpretation.

Click here to access Survey Monkey Link to answer the following question(s):

Question 26: How much would including final diagnosis in the MDSAH increase surveillance value of laboratory data?

Question 27: How feasible is it to include final diagnosis in the MDSAH?

Question 28: Do you have any further comments on final diagnosis as an element of an updated MDSAH?

New elements associated with resilience and disease risk

During interactive sessions, several novel elements, all linked to resilience and disease risk were identified as of interest. These variables could be included in the submission form history or clinical impressions as free text, however, it was identified that there may be value in collecting these elements in a more structured format. These novel elements have been grouped together in the next section. To collect this novel data, it would likely be necessary for either the submitter or laboratory to indicate a qualitatively score. A free text field to include additional details might also be of value.

Animal movement – An animal movement data element could provide information about the frequency and/or duration of animal interactions and exposures (i.e., whether animals or groups of animals are mixing extensively). This data element could be helpful to evaluate risk of disease transmission across different spatiotemporal scales. Elements related to animal movement include comments noted in the history, farm type, group type, and biosecurity level. Animal movement could be qualitatively scored by the submitter as high, medium, low, or unknown.

Example of animal movement categories:

- Production (flock/pen): all in/all out vs open
- Production (individual): open or closed herd, travel
- Companion: travel, isolated
- Free living/ wildlife: isolated vs mixing
- Other (e.g., captive): travel, isolated

Click here to access Survey Monkey Link to answer the following question(s):

Question 29: How much would collecting a qualitative animal movement score in the MDSAH increase surveillance value of laboratory data?

Question 30: How feasible is it to collect a qualitative animal movement score in the MDSAH?

Question 31: Do you have any further comments on animal movement as an element of an updated MDSAH?

Biosecurity –. A biosecurity data element could be used in production animal settings or other group housing environments such as shelters. Considerations might include; pest management on farm, PPE

for staff/ visitors, routine disinfection of machinery/ equipment, deadstock management, quarantine protocols for new animals before introduction to others, isolation procedures for sick animals. Biosecurity status could be qualitatively scored by the submitter as high, medium, low, or unknown. Elements related to biosecurity include movement score and comments in the history.

Click here to access Survey Monkey Link to answer the following question(s):

Question 32: How much would collecting a qualitative biosecurity score in the MDSAH increase surveillance value of laboratory data?

Question 33: How feasible is it to collect a qualitative biosecurity score in the MDSAH?

Question 34: Do you have any further comments on biosecurity as an element of an updated MDSAH?

Stress – Stress includes environmental parameters that affect animal health, welfare, and wellbeing. Stress could be qualitatively scored by the submitter as high, medium, low, or unknown. Elements related to stress include comments within the history.

Examples of criteria to rank stress:

- Production (flock/pen):
    - Terrestrial: air quality/ ammonia level, animal density, temperature, lighting, humidity, feed disruption, lack of social interaction
    - Aquaculture: water temperature, salinity, pH, ammonia level
- Production (individual): air quality/ ammonia level, animal density, temperature, lighting, humidity, mixing
- Companion: animal density, feed disruption, lack of environmental stimulation
- Other (e.g., captive): animal density, temperature, lighting, humidity, feed disruption, lack of social interaction

Click here to access Survey Monkey Link to answer the following question(s):

Question 35: How much would collecting a qualitative stress score in the MDSAH increase surveillance value of laboratory data?

Question 36: How feasible is it to collect a qualitative stress score in the MDSAH?

Question 37: Do you have any further comments on stress as an element of an updated MDSAH?

Disease Severity– Disease severity could be used as an over all indicator. This element could be ranked high, medium, low, or unknown, and is inferred based on the indicators described. It would be used by laboratorians and epidemiologists and not the submitter. Other data elements and factors linked to disease severity include history, volume of samples submitted, and amount of testing requested. This data element could be considered a "post hoc" analysis and might not be readily practical or of use for the submitter if it were structure to rely on multiple data inputs from more than one submission

Click here to access Survey Monkey Link to answer the following question(s):

Question 38: How much would collecting a qualitative disease severity score in the MDSAH increase surveillance value of laboratory data?

Question 39: How feasible is it to collect a qualitative disease severity score in the MDSAH?

Question 40: Do you have any further comments on disease severity as an element of an updated MDSAH?

Next Steps

After survey results are collected and analyzed, they will be synthesized and reported back to survey participants. An interactive session to allow discussion of findings may be scheduled.

For questions about the report or survey, please contact Harold Kloeze (kloeze@ymail.com) or Doris Leung (dleung@animalhealthcanada.ca)

Appendix 1. One Pager Document on Minimum Dataset for Animal Health Project

CANADIAN ANIMAL HEALTH SURVEILLANCE SYSTEM

MINIMUM DATA SET FOR ANIMAL HEALTH SURVEILLANCE (MDSAH) PROJECT

Led by the Canadian Animal Health Surveillance System, this project will update the minimum data set work with considerations of a changing surveillance environment in Canada.

BACKGROUND

In Canada, animal health laboratories are critical sources of data and information for animal health surveillance. The minimum data set project for animal health (MDSAH) will update the work completed in 2011 to develop a recommended minimum set of animal health laboratory data elements required for surveillance in Canada.

The 2011 project resulted in publication of a minimum dataset anticipated to allow meaningful analysis of collated results from the various public sector provincial, academic and federal animal health laboratories for the purposes of disease detection and characterization, syndromic surveillance, and disease control. The original project was directed by public sector animal health epidemiologists from the F/P/T community in Canada, with input from laboratorians and decision makers.

CORE ELEMENTS OF MINIMUM DATA SET FOR ANIMAL HEALTH SURVEILLANCE

- Unique identifier
- Premises identification
- Date submitted
- Geographic location
- Species
- Farm type
- Group type
- Total population of tested species
- Number sick
- Number dead
- Test(s) performed
- Disease agent
- Test result
- Disease classification by submitter
- Final laboratory diagnosis

(Kloeze *et al.*, 2011)

WHAT IS NEW ABOUT THE MDSAH PROJECT

- The project will leverage new collaborations within the expanded animal health surveillance community to gain focussed input from current users and producers of animal health surveillance data and information about what should be included in a current minimum dataset.
- The project will engage an expert technical group to gain insight on how genomics data is produced by diagnostic laboratories and how it might be effectively used for animal health surveillance.

ANTICIPATED RESULTS

- An updated recommended minimum data set for animal health surveillance
- A preliminary report examining how to incorporate genomics data into animal health surveillance
- The project will run from May 2021 to March 2022.

For more information about the project, please contact us at cahssinfo@ahwcouncil.ca. For more information on the Canadian Animal Health Surveillance System, visit http://cahss.ca.

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