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Creating and using databases to track tissue diagnostics

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The advent of computers and data management software has brought disease monitoring to a new level. ELISA readers can process large numbers of samples, offering results in an electronic format that can easily be manipulated, processed, and archived. Beyond this, a number of diagnostic laboratories have begun making case results available over the Internet. Advances in technology have made it possible to eliminate much of the extra paper and/or duplicate data entry associated with traditional serology analysis.

Tissue diagnostics are more complex. An individual case may employ any number of different tests on a variety of different tissues. There may also be a lack of standardization among different diagnostic laboratories. In addition, histologic description requires experience and a discerning thought process to interpret.

Diagnostic labs may perform an array of different tests. These include, but are not limited to, bacteriology, virus isolation, molecular tests, immunohistochemistry, FA tests, electron microscopy, and impression smears (parisitology). The simplest form of data capture could follow the paradigm "Test Performed ‡ Pos/Neg result," but other details about each test could be recorded.

Collecting and organizing diagnostic information from a variety of sources offers us the opportunity for streamlining and focusing our thought processes when dealing with disease. What is the history of this farm's disease? How does this site compare to other sites in the same flow, or in the same genetic pyramid? What about the seasonality of disease, or the emergence of resistant bacterial strains on a farm? How can a farm be detailed for a new associate or summarized for an outside consultant? There is, obviously, no real substitute for today's clinical picture

Figure 1

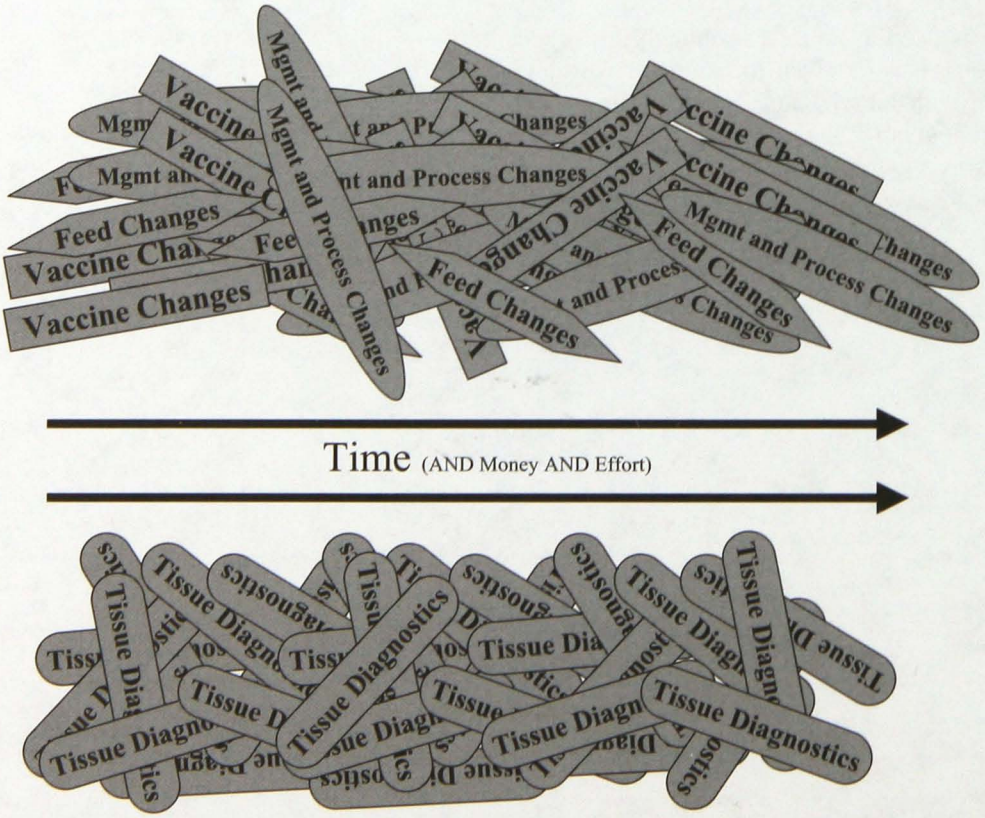


Figure 2

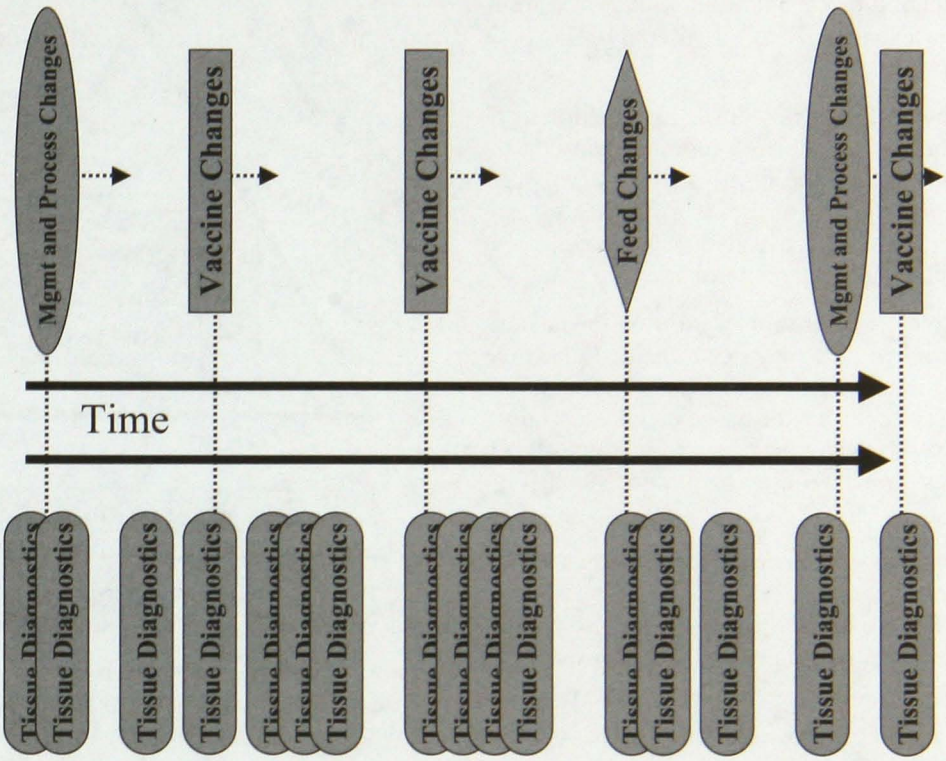
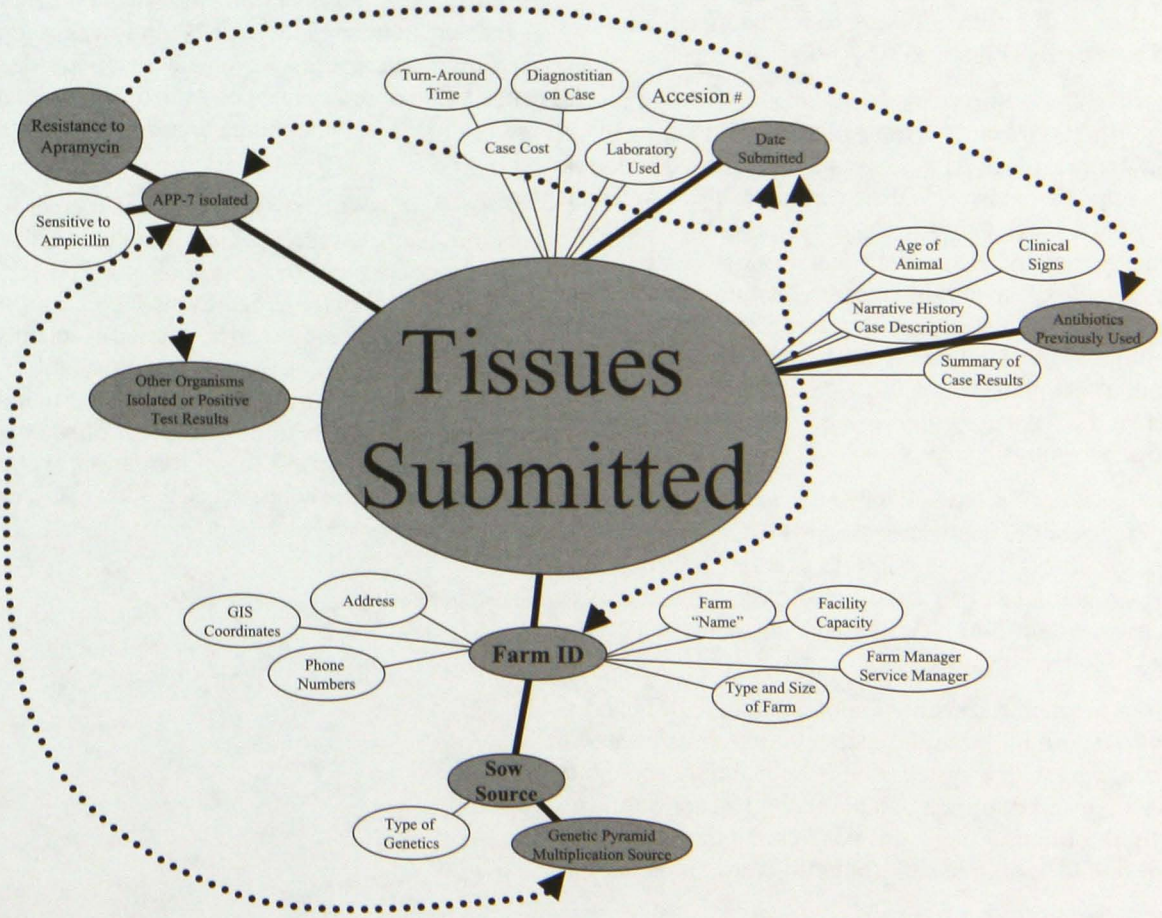


Figure 3



or for understanding the methods and mentality of the farmer, but managing tissue submission data in a well-structured database, can be an excellent tool for keeping track of useful information.

Consider the typical flow of diagnostic information from tissue submission. At best, the lab report is housed in a three ring binder bearing the farm's name. At worst, it ends up on the floorboards of a pickup truck after one review. In either case, there is usually hassle involved with retrieving this information at a later date.

Besides the diagnostic results, other information has relevance for current production. Feed changes, vaccine changes, process or management changes—all can affect health and all can affect what the tissue diagnostics might reveal. Tracking and organizing this information offers a systematic ability to make better health decisions (Figures 1 and 2).

As a specific application of using tissue databases in disease problem-solving, consider the following scenario. APP-7 is identified in a finishing pig tissue set from Farm X. The isolate is sensitive to ampicillin but resistant to apramycin.

> Point in time diagnosis‡prescribe treatment‡end of story?... or beginning of story?

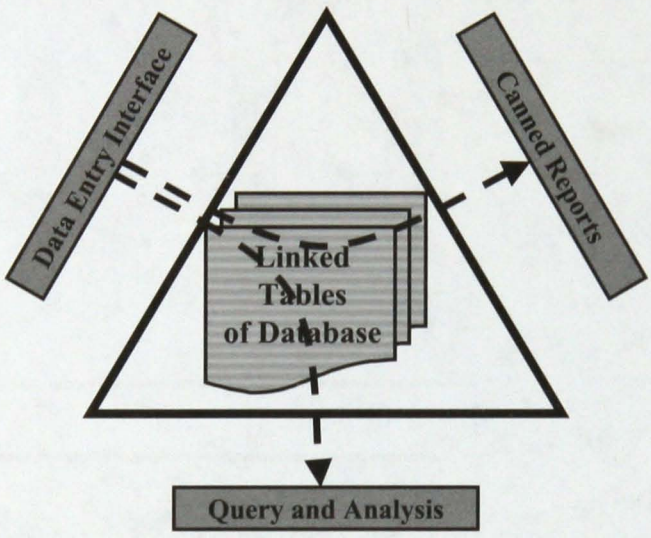
By entering information into a properly structured database, a web of information can be linked together rapidly and repeatedly (Figure 3).

Consider these questions. Have other farms within the same genetic pyramid also been diagnosed with APP-7? How many cases of APP-7 have been diagnosed over time (recently/seasonality)? Is there a relationship between the antibiotics previously used and the antibiotic resistance of the organism? How much diagnostic effort has been put into this site over time (recently/historically)? Is there a pattern of co-infection with other disease agents? The usefulness of a database in answering these questions is minimal with only a few other cases to reference. However, as the database grows in size, small questions begin to find meaningful answers.

Another use for a tissue database is as a solid and quick reference for the application of AMDUCA in extra-label drug use. It becomes possible to generate a farm's real-time disease history in a very short period of time. As a licensed, prescribing veterinarian, this can reduce your level of legal exposure.

Before beginning construction of a database, it is necessary to determine what will be measured. A balance will be achieved with a system that is both simple enough to be administered and complex enough to capture meaningful information. Someone has to input the data, so the form should be simple and straightforward. Someone has to pull the information out, so the data captured should be descriptive enough to draw specific conclusions.

Figure 4



Diagnostic data can be entered quickly and accurately because of the software's ability to complete your words as they are typed, as well as catching typographic errors. As data accumulates in several linked tables within the database, standard, or "canned," reports can be created. For example, these can include sow source summaries, genetics summaries, disease breakdowns, and antibiotic sensitivity summaries. Beyond these reports, deeper, more specific analyses can be performed. Queries can pull out individual or summary data to answer specific questions (Figure 4).

When dealing with larger amounts of standardized information, from tissue collected in a standardized way, it becomes necessary to use a tool more powerful than a spreadsheet. Databases represent such a tool. In a database, diagnostic results can be entered efficiently and useful information can be extracted in a readable, repeatable format. Tissue diagnostics are very important in the recognition and treatment of disease. It only stands to reason that by organizing this information, we may better understand, treat, and, perhaps, predict disease.