Approaches to Acquisition and Management of New Knowledge

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The computer has become accepted as an information management tool in many fields. Yet veterinarians are very selective with the level to which we will rely on computerized information systems and with the types of information we will manage with computers. Traditionally we have accepted the computer as a means of managing numerical or financial information. More recently we have begun to accept the computer as an information tool for practice management, medical records, and herd health data. Now computer software is giving us the means to develop easy-to-use medical information systems. Two basic software concepts are presented in this paper, hypertext applications and the Problem Knowledge Coupler.™

The concept of "hypertext" was first introduced to the computer community by Ted Nelson in the 1960s. Put simply, hypertext is the means to link textual information to other textual information. Hypertext programs give one the ability to create large, cross-referenced documents with virtually unlimited search capabilities. Hypertext provides a means of navigating through large volumes of information. With the cross-referencing and search capabilities of hypertext documents it becomes possible to develop systems to successfully deal with information overload. With the geometrically increasing volume of information in veterinary medicine simple and effective means for navigation through information are essential.

Reference File

The reference file is a system to allow the veterinary practitioner to keep track of personal references. With this system the veterinarian enters basic information and brief abstracts of relevant articles into the system. The computer racks reference numbers, title, author name(s), journal name, keywords, and the abstracts on each article. The veterinarian can find the record for any article by selecting the title of the article or by searching on any combination of words from the title, author name(s), keywords, or the abstract. This system gives the veterinarian a simple means by which to manage personal reference files and provides rapid search capabilities for specific information.
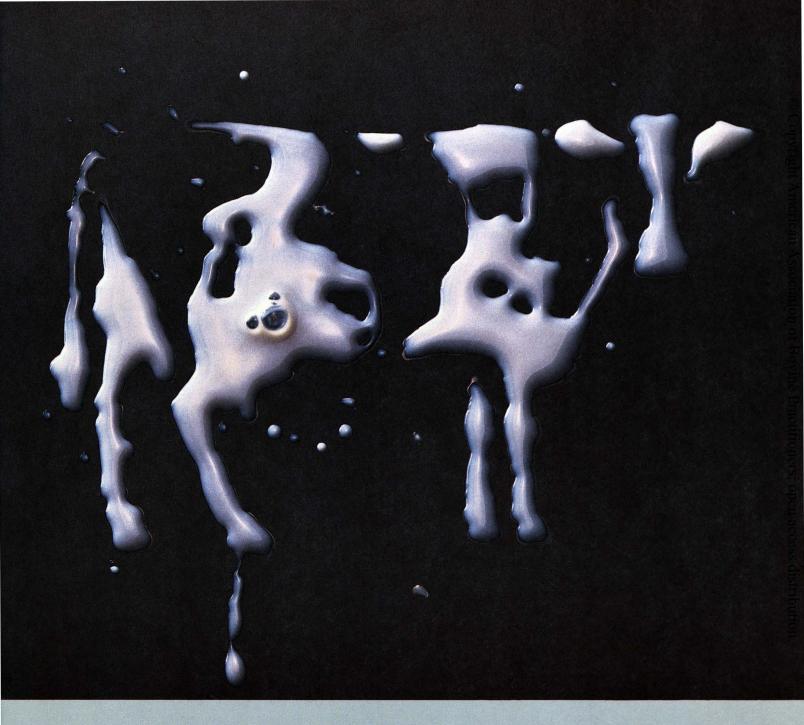
Electronic Journals

Traditional printed information, while serving as an effective information distribution system, offers no convenient search capabilities. The printed textbook or journal article possesses none of the cross-referencing or search capabilities that are possible with electronic information media. Hypertext based electronic journals or textbooks would facilitate the use of new veterinary medical information and would give the practitioner an improved method by which to access new information. While there are no veterinary journals currently being published in hypertext format, there is at least one veterinary textbook currently being developed in this format.

Electronic Syllabus

The electronic syllabus is an extension of the concept of hypertext electronic journal. Currently in use at the College of Veterinary Medicine at Mississippi State University the electronic syllabus provides a mechanisms for the delivery of complete course objectives and course notes linked together in hypertext format. The student navigates through the information in the syllabus by pointing and clicking the mouse. Currently all course syllabi and many course notes are published in this format. The long range goal is to link syllabi and course notes from one course with those of another course. Envision a student studying infertility in the Food Animal Disease course of the junior year of the curriculum. The student has questions about the uterine or ovarian pathology associated with infertility, clicks on a word in the infertility course notes and immediately the appropriate notes from the Pathophysiology Course notes from sophomore year. While reviewing the notes on ovarian pathology, the student has questions regarding normal ovarian physiology, clicks on a word in the Pathophysiology notes and immediately the appropriate notes from the freshman year Physiology course appear. After reviewing ovarian physiology another click of the mouse puts the student back in the infertility notes. Carrying the example one step further would allow linkage to textbook or journal references.

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Electronic Case Analysis

Frequently continuing education seminars are presented in a case analysis format. While presentations in this format are certainly valuable, the veterinarian is generally put in a completely passive mode. The presenter describes the situation, the options available, and the choices taken. A more educationally sound approach is to involve the veterinarian in an interactive mode in which the veterinarian reacts to the situation making choices and monitoring the changes in the animal or animals involved. The electronic case analysis system provides a means for the production of such interactive continuing education programs. The user is presented with an opening scene describing the situation with a case and presented with up to five possible choices. On analyzing the situation the user selects one of the choices and is immediately presented with additional information about the case. Each choice activates a scoring system and an accounting system and presents the user with the revised situation with the case based on the choice made. The system allows the development of complex cases with several possible conclusions contingent upon the choices made.

The Problem Knowledge Coupler

The Problem Knowledge Coupler is a computer aided diagnostic and computer assisted patient management system. The program is the driver for a computer assisted diagnostic package originally produced for human medicine. The nature of the software makes it suitable to any "diagnostic" situation. These systems are constructed to allow the user to build expert diagnostic programs. The database consists of five lists: causes, findings, options, comments and questions, with interlinkages between each. For any diagnostic problem, there may be many possible CAUSES. Each cause has one or more specific FINDING which may help differentiate it from other causes. For every CAUSE, there are also one or more diagnostic or therapeutic OPTIONs. For every finding in the system, a QUESTION is written. The user responds to a list of questions. Each positive response results in a "vote" for a specific finding which in turn indicates one or more specific cause(s). The total "vote" for each possible cause is tallied and the user is presented with what is called a Rule Out list (a list of possible causes). For each potential cause, the user can request additional information including diagnostic or management options. Comments can be interspersed throughout the program wherever helpful.

The veterinary profession is attempting to come to grips with the constantly growing body of veterinary medical information. Our attempts to "learn" the important basic concepts in veterinary school and keep up by reading journals and attending continuing education programs after graduation are not serving us well. We struggle to keep up, struggle to read the relevant articles, struggle to remember important information. How often do we find ourselves trying to remember something we read last month, last week, or last night? How often do we make decisions without access to the most current or most relevant information? We need basic systems to put information into the hands of veterinary practitioners at the time of need. With the proper information tools we can focus efforts on decision making rather than memory of information. We can make decisions in an INFORMATION RICH environment rather than an INFORMATION DEPRIVED environment.

The paradox is that we tend to categorize information. We accept the value of information systems with some types of information, while rejecting the use of information systems with other types of information. This acceptance seems to be based primarily on tradition, ease of development, and ease of use of information management systems. The hardware and software systems are now available giving us the ability to create powerful information tools. We can create systems that will put the most up-to-date information in the hands of all veterinary practitioners, and revolutionize the way we make decisions. The irony is that while the software and hardware systems to build these tools are available, the professional and societal systems are not. To build the required systems takes comment by the veterinary profession and by the professional societies. An organized effort to build these tools is necessary. As a profession we must decide if we have a strong enough desire for these new information tools to commit the people and money needed for their development.