Title

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Effective Bibliographic Searching for Animal Alternatives in Veterinary Medical Education: The UC Davis Web Site

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ABSTRACT

To prepare students in just four years to enter veterinary practice, veterinary medical educators offer an array of laboratory and clinical experiences coordinated with didactic instruction. Recent curricular changes have reduced the numbers of animals involved in painful or terminal procedures. For each use of animals, veterinary educators are required by the USDA's policies 11 and 12 to complete animal-use protocols that include questions on alternatives to procedures causing more than momentary pain or distress. Veterinary medical educators seeking improved teaching resources and methods or completing animal-use protocols may find it frustrating to locate the relevant information, which is dispersed across many databases. This paper addresses a gap facing veterinary educators by presenting user-friendly searching tools that are targeted toward (a) locating teaching resources and (b) conducting effective bibliographic searches on standard teaching laboratory procedures, as required for animal-use protocols. These tools simplify searching by providing streamlined access to the resources being sought. Facilitating efficient and effective searching by users can improve teaching and simplify compliance with USDA requirements.

INTRODUCTION

In the United States, veterinary medical education has conventionally included hands-on surgical experience and other laboratory activities that help prepare students to practice veterinary medicine following graduation. In recent decades, uses of animals in undergraduate, graduate, and veterinary medical education have sharply declined, as alternative teaching methods and tools have been developed and social perspectives on animal use have shifted. A variety of specialized databases provide information on the growing number of resources for use in teaching about dissection, anatomy, and physiology. In this paper, we present three Web-based tools that deliver efficient access to information on teaching resources. The first[1] lists available bibliographic databases for alternatives searching. The second[2] offers streamlined searches of four databases pertaining to resources for education. The third[3] displays sample searches relating to the animal-use protocols that would be prepared for many teaching laboratories for procedures that are commonly used in veterinary medical education.

The Animal Welfare Act[4] requires considering alternatives to painful or distressing procedures involving animals, whether in teaching, research, or testing. This Act is implemented by requiring approval of the animal-use protocol pertaining to a particular teaching laboratory or procedure. The regulations require that principal investigators consider alternatives to procedures that may cause more than momentary or slight pain or distress to animals and provide a written narrative in the protocol concerning the availability of alternatives. USDA animal care policy 11 provides a detailed description of painful and distressful procedures.[5] Investigators are to provide a written narrative of the methods and sources used to determine the availability of alternatives, including refinements, reductions, and replacements. Detailed guidance on conducting a database search for alternatives was included in policy 12.[6] Here, the investigator's narrative is to include the names of the databases searched, the date the search was performed, the period covered by the search, and the key words and/or the search strategy used.

Considering the ongoing creation of new resources for teaching and the development of new technologies, frequent searching and consideration of alternatives are appropriate so as to identify and consider new methods for teaching. This can be a challenging task, as the literature is dispersed and procedures are not well indexed. Even the first step, selecting an appropriate database for searching, can be confusing.

Despite these challenges, as improved teaching methods become available, they offer a potential for replacing the use of animals, reducing the pain or distress that may be caused by certain procedures, and more fully implementing the concept of alternatives as exemplified by the 3R objectives: reduce, replace, and refine.[7] Imaging methods can replace interventive surgeries and even euthanasia and provide an opportunity for monitoring an animal's internal condition over time. Cadavers are used to prepare reusable prosections that are instructive to students. The technique of plastination produces authentic reusable specimens that complement software images, reducing the number of animals used in teaching. For live animals used in handling or training procedures, considering the animals' behavioral needs improves husbandry, resulting in the animals' being less stressed and more physiologically stable.

GUIDE TO BIBLIOGRAPHIC DATABASES FOR ALTERNATIVES SEARCHING

This report provides a description of the Web-based databases that have been constructed at the UC Center for

Animal Alternatives (UCCAA) at Davis that provide extensive referencing to alternatives to the use of live animals for teaching purposes.[1,2,3] As the starting point, this Web-based guide[1] to databases introduces the array of databases available pertaining to alternatives, indicating appropriate databases for many specific topics. This guide assists investigators in identifying the appropriate databases to use when seeking specific types of information related to alternatives. Information is presented in search grids that provide point-and-click access to specific databases. The grids provide separate groupings of those resources that are freely available and those that are proprietary and available to subscribers.

WEB SITE ON DATABASES FOR TEACHING RESOURCES

There are four particularly useful databases of instructional resources that provide extensive support and information on teaching about animals. Each of these is conventionally described by an acronym: NORINA, EURCA, AVAR, and InterNICHE. The first time, a naive user may find the amount of information overwhelming or inaccessible for a particular purpose. The UC Center for Animal Alternatives (UCCAA) tool [2] offered here delivers basic instructions and targeted access to subsets of these resources by species, educational formats, and body parts. For new users, the UCCAA site offers a detailed tutorial for each database to offer help in using these tools.

NORINA (Norwegian Reference Centre for Laboratory Animal Science and Alternatives) is the most comprehensive database of resources, with about 4,000 entries, including computer programs, CD-ROMs, videos, films, slides, 3-D models, and classroom charts.[8] Users can immediately access a record on each product that provides a full description, cost, and contact information. To provide teachers more efficient access to entries, the UCCAA site offers point-and-click menu grids oriented to topics that teachers need: anesthesia, anatomy, dissection, histology, organs/parts, pathology, pharmacology, physiology, surgery, and veterinary medicine. Subcategories available for scrolling in the pop-up menus include breakdowns by species or type of tool, such as CD-ROM or teaching model. These grids provide the user with a manageable subset of entries in a specified category. When an item is selected in this database, it links to a standardized detailed record specifying the program name, category, type, description, source, telephone, telefax, price, computer type, year of version, author, comments and references, e-mail, and Web site (Figure 1).

EURCA (European Resource Center for Alternatives in Higher Education) offers a smaller set of resources selected for use in higher education.[9] In-depth information on the resources includes reviews. The UCCAA site provides a point-and-click grid, with direct links to records on the following topics: dissection, anatomy, physiology, model, computer program, and video. When an item is selected, a brief listing provides the title, a summary description, the supplier and price, a summary of reviews, and links to full texts of reviews. A link offers a full description of the resource type, educational level, language, detailed description, target group, the animal experiment replaced, the supplied support materials, notes on teaching use, practical time, analysis time, author, year of version, NORINA reference number (linked), InterNICHE loan (linked), listing in alternatives databases, supplier (linked), and full ordering information (linked). Users are offered an opportunity to provide comments about these alternatives (Figure 2).

AVAR (Association of Veterinarians for Animal Rights) offers its own search engine, as well as an option of searching in Google.[10] The UCCAA site suggests appropriate terms for searching that can be combined in an AVAR search, including animal species, organs/parts, disciplinary categories, and resource types. Selecting an item on this site leads to a standard record, including the title, medium, discipline, species, educational level, cost, source (linked), catalog, and notes (Figure 3).

InterNICHE (International Network for Humane Education) offers lists of alternatives for teaching in the biological sciences and medical and veterinary medical education.[11]

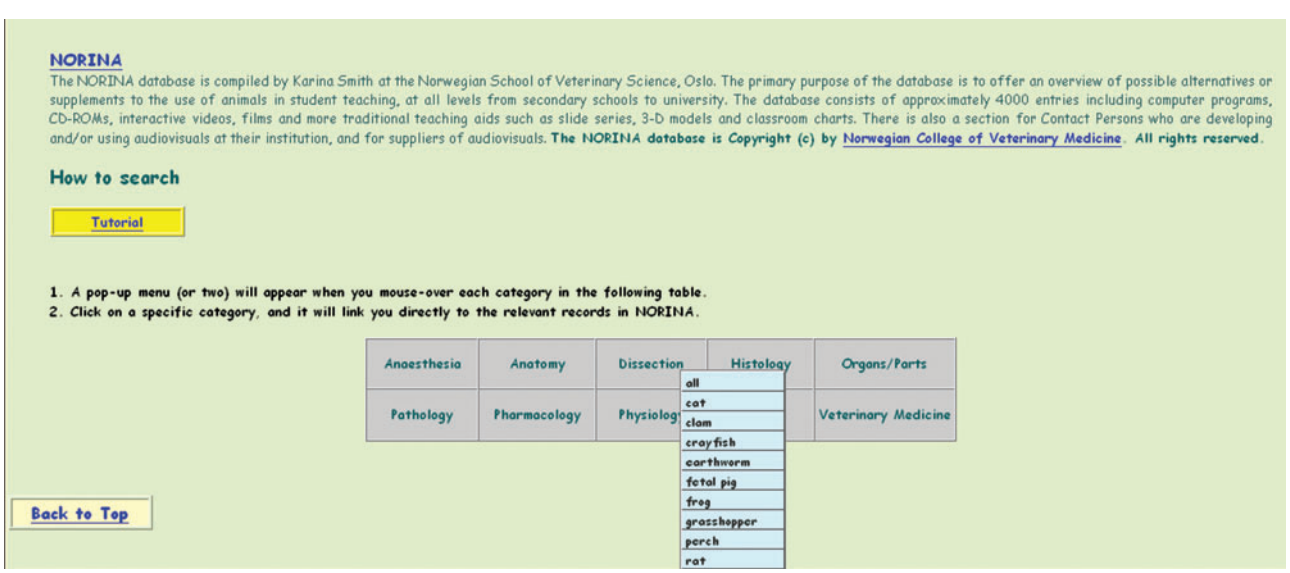

Figure 1: Norina search site

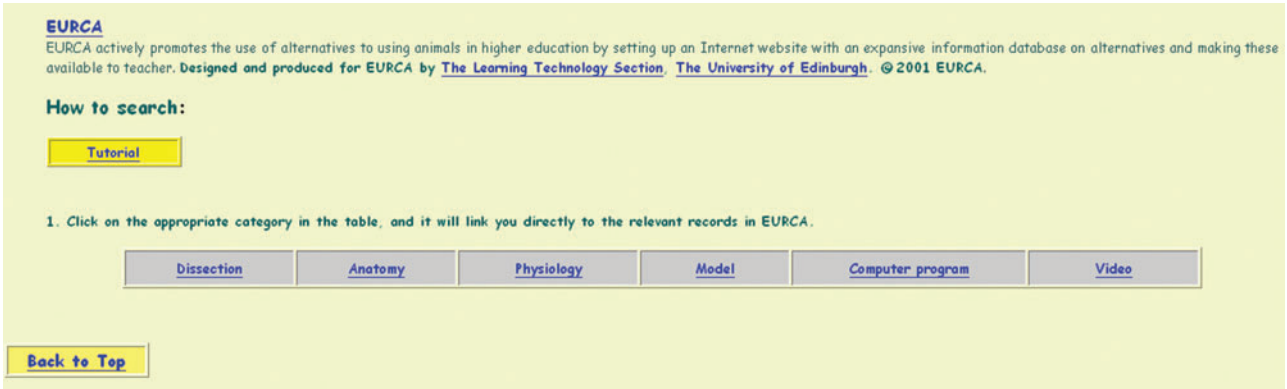

Figure 2: EURCA search site

The UCCAA grid gives point-and-click access to the categories of anatomy, clinical skills and surgery, physiology, and miscellaneous. Items within each category are organized under subtopics, including CD-ROMs, models and simulators, videos, and books. When an item in this database is selected, it links directly to the Web site of the provider of the product. When EURCA reviews are available, direct links are provided (Figure 4).

WEB SITE ON SAMPLE SEARCHES FOR ANIMAL-USE PROTOCOLS IN VETERINARY MEDICINE

Veterinary medical educators are required by USDA's policies 11 and 12 to complete animal-use protocols that include questions demonstrating that the applicant has searched for alternatives to procedures causing more than momentary pain or distress to animals. At this UCCAA site,[3] searches for sample protocols pertaining to typical teaching laboratories in veterinary education are provided, in a series of search grids drawing from five databases. The databases featured in these grids include two general databases that are free—PubMed, dealing with research that is oriented toward human health, and AGRICOLA, focused on research concerning animals. Two free databases specializing in teaching resources are included in these sample searches, NORINA and AVAR. An additional database included, which is proprietary and may be provided by institutions, is CAB, a particularly outstanding

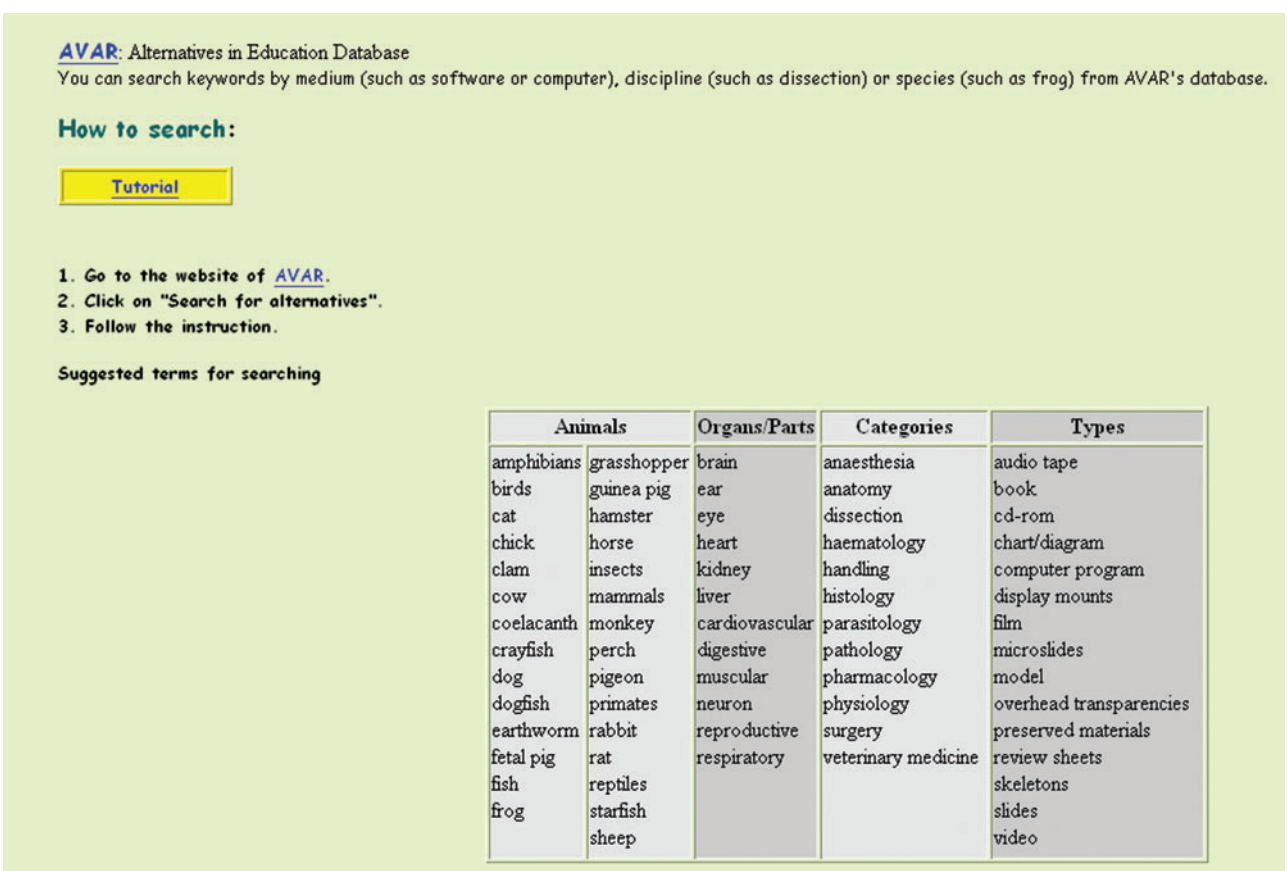

Figure 3: AVAR search site

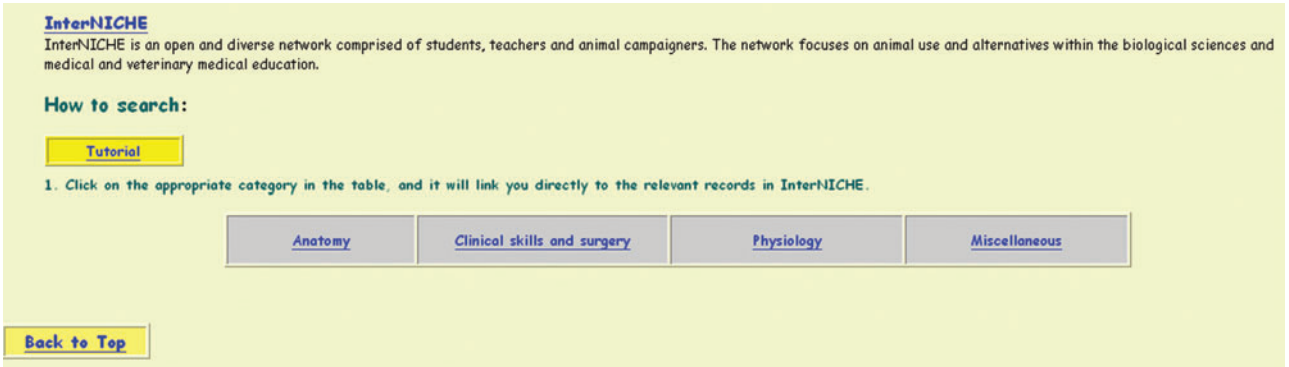

Figure 4: InterNICHE search site

database for information on animal research and techniques. Sample searches pertain to protocols for cats and dogs—handling/physical examination, surgery/anesthesia, radiology/endoscopy/ultrasonography, and physiology. Similar procedures are offered for horses, large/farm animals, avian/reptiles, and laboratory animals.[3]

For the two complimentary general databases, PubMed and AGRICOLA, the grid on each topic provides appropriate search strategies that can be accessed by point-and-click use of the related database for a live search. For users who have access to CAB through their institutions, the approach is the same and search strategies are offered that can be copied and pasted into the search box.

For the two databases on teaching resources, NORINA and AVAR, searches were conducted in 2005 on each of the sample protocol topics and direct links are offered to those products that appeared in those searches. The links lead to the product descriptions mentioned earlier in the discussion of each of these databases. The grid includes complete titles of these products and specifies the type of product, such as video film, audio tape, CD-ROM, or teaching model. The user can thus select for review the products from the list that are most likely to fit the instructional needs (Figure 5).

CONCLUSIONS

Three Web sites developed by the UC Center for Animal Alternatives provide streamlined access to information concerning teaching resources for veterinary medical education. The first site[1] lists available bibliographic databases for alternatives searching. The second site,[2] on databases for teaching resources, provides direct links, descriptions, and tutorials for the four complimentary databases that deliver access to teaching resources. The third UCCAA site[3] provides a roadmap for veterinary medical educators seeking to conduct an effective and efficient search for teaching alternatives for particular instructional laboratories. Taken together, the three UCCAA sites can serve as a standard model for effective searches for alternative teaching resources. They can be used as instructional tools to demonstrate how one can go about searching in these

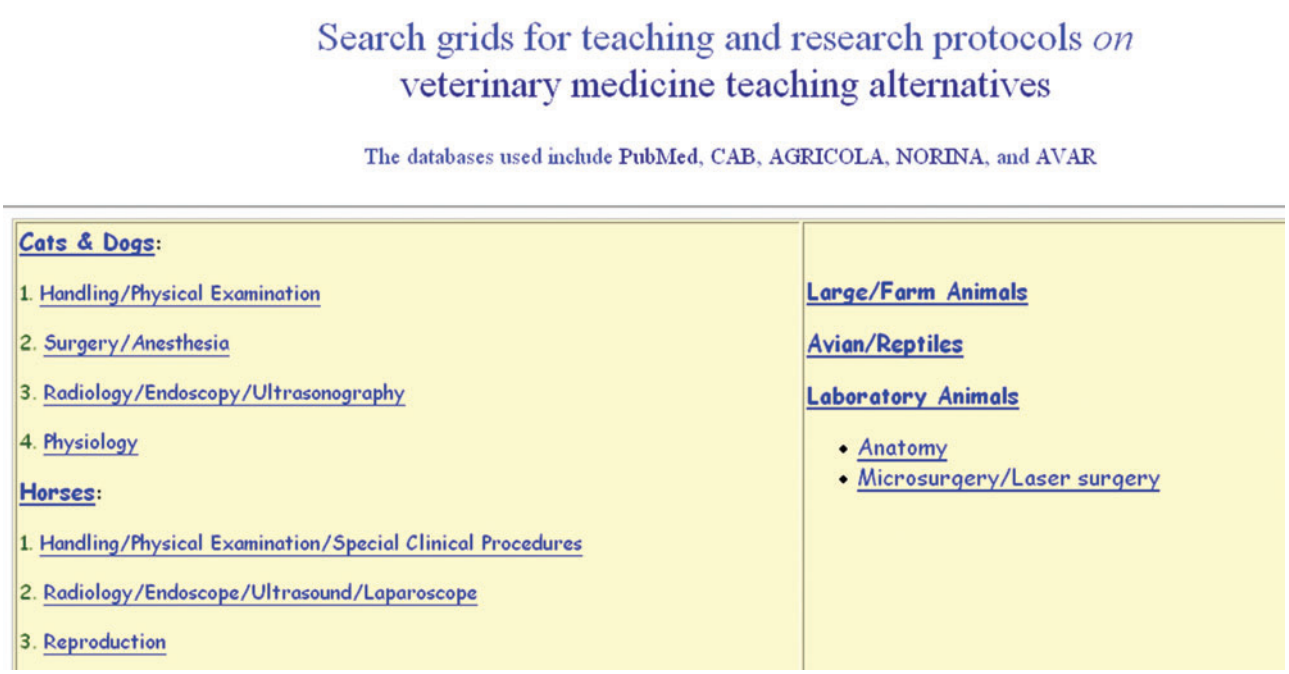

Figure 5: Protocol search page

subject areas. They also offer a starting point that a user can, with growing experience, use as a springboard for further searching.

ACKNOWLEDGMENTS

The extensive electronic library holdings of the University of California make it possible to explore, identify, and distinguish the unique features of the resources presented in these search grids.

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