Using Web of Science to find genetics-related research about cattle

Description:

This tutorial describes fundamental techniques for searching Web of Science Core Collection. These techniques apply to searching BIOSIS Previews and Zoological Record as well.

Transcript:

Hi, my name is Peter Fritzler and I'm a librarian at UNCW's Randall Library. In this video tutorial, I'll discuss different techniques for using Web of Science Core Collection to find articles relevant to the study of genetics and cattle.

While this video will give you a sense of how you can utilize Web of Science Core Collection for research on genetics and cattle, the search principles that I describe are transferrable and can be applied to researching many different topics or questions. However, if you're confused or stuck, please feel free to contact me if you need help. I'll be more than happy to help you.

Okay, so why use Web of Science Core Collection? Well, Web of Science is a leading indexing database of research literature across all scientific disciplines. Moreover, Web of Science's "Core Collection" only indexes "high impact" journals in their respective disciplines; in other words, to borrow a term from social media, Web of Science only "follows" the leading journals in each discipline over time. This allows scientists and students to see what's been published related to their topics in these more impactful journals. There is some nuance, however, to what it means to be a "high impact" scientific journal but that's a topic for another discussion. For now, just think in more general terms of Web of Science being a central portal to searching the leading scientific and scholarly journals in their respective disciplines.

Because of its unique indexing scope and added functions for analyzing scientific topics and papers, Web of Science is not freely available; instead, it is available only through a subscription. Fortunately, UNCW and many other research institutions subscribe to it. While Web of Science is a good starting point for researching a question or topic, there are several other databases that index cattle-related scientific research, including PubMed and Zoological Record. These are much more comprehensive in their scope of coverage; however, having a database like Web of Science that helps you identify articles from the most impactful (i.e. important) journals is key to your journey into understanding some of the nuances of scientific publication and communication. As you begin to specialize in an area of scientific inquiry, you'll become further acquainted with important disciplinary journals, along with the broader landscape

of scientific communication in that area. For now, however, becoming familiar with Web of Science will serve you well in genetics-related research and beyond.

To access Web of Science Core Collection, you will want to start at the Randall Library homepage. From there, click the Find Databases button which will take you to a screen with an alphabetical list of Databases by Subject. Click the subject for Biology and you'll see a screen with a list of Recommended Databases. Web of Science Core Collection will be at the top of that list. From there, click the link to Web of Science to access the database. Please note you might be asked to login with your UNCW credentials if you're off campus.

Once you're in the database, you'll see a search box like the one here. You can also click the Add Row feature to add additional rows for searching. I generally recommend using this feature to aid with searching.

Okay, let's examine some of the fundamental techniques for searching Web of Science. First, I'll discuss record structure, followed by Boolean operators, phrase-searching, and wildcards. Lastly, I'll describe some of the differences between searching by Topic and Title. Learning how to effectively apply these techniques, and becoming proficient with them over time, can expedite the time and effort you spend searching the scientific literature. In short, your ability to correctly apply these techniques should help improve the quality and quantity of results in your search. Let's begin.

First, we want to make sure we understand that Web of Science is a searchable collection of records, and that each record contains information describing one publication. Each record has a common set of fields for consistency, and each field contains a specific piece of information describing that publication. For example, a record has a title field, an author field, a publication field, and an abstract field along with several additional fields. As you can probably guess, the title field contains the title of the publication while the author field contains the names of the authors that contributed to the publication. The abstract also contains, verbatim, the abstract as it appears in the publication itself. This image is a simplified representation of the Web of Science database. You can see a collection of records with an interface overlay for searching them.

Let's look at one of these records in more detail. Here's an example of a record in Web of Science. You'll see that it contains information describing one publication and that the information is included in specific fields: a title field, an author field, publication or source field, abstract field and keywords fields.

Depending on how you define your search, Web of Science can search one or more of these fields in each record of the database.

Knowing a little about this structure is helpful for understanding how the database works when searching, particularly we get into distinctions between Topic and Title-field searching.

Now that we have a basic familiarity with the database's structure, we can begin to explore techniques for searching. In this segment, I'll be discussing Boolean operators which are a fundamental part of the database search environment. I'll also be incorporating the use of quotation marks, wildcards, along with some variation between TOPIC – and TITLE – based searching.

First, a word about terminology. When thinking about searching the scientific literature it's important to remember that you'll need to use scientific terms when searching. It's also important to consider the potential varieties of terms that can be used to search for what we're thinking because not all scientists are going to use the same terminology to describe their research. For example, when thinking about cattle, there could be several terms that scientists use to describe these animals. Among several others, these could include the following:

Term A1: cattle
Term A2: cow
Term A3: bovine
Term A4: Bos taurus
Term: A5 B. taurus

The last two terms, *Bos taurus* and *B. taurus*, represent the scientific name for one species of domestic cow. Another species of domestic cow to note as well is *Bos indicus*, or its abbreviated form, *B. indicus*.

We don't want to rely on searching the database using only one of these terms because we might miss finding publications that use a different term, and these could also be relevant and important. So this makes for a good scenario to use a Boolean OR operator. The Boolean OR operator is used to find publications that include one or more of these varying related terms or synonyms. Using the Boolean OR operator also reduces the risk of missing any publications that could be useful to your work. So how do you use a Boolean OR operator in a search query? Let's take a look.

Here is an example using the Boolean OR operator in a search query within Web of Science. You can see that the Boolean OR is placed between each term in the search query. As a flexible operator, the

Boolean OR allows for either of these terms to be present in each of the retrieved records. As long as a record has at least one of these terms it will be included in the results. This, of course, will increase the number of results, but again, it also helps to reduce the risk of missing anything potentially useful to your research. Also note that I placed this part of the search query in the first search box row, and I added a second row for the next part of the search. You can use the Add row function to increase the number of rows.

Now, I'm specifically interested in genetics-related research about cattle so I need to also think about incorporating this concept into my search query. Again, there could be a variety of terms to consider including in the search so I'm going to use a Boolean operator here as well. Among others, some of these terms could include the following:

Term B1: gene
Term B2: genetics
Term B3: phenotype
Term B4: allele

Keep in mind, when searching you might be looking for publications that examine a particular characteristic or trait so you'll need to consider applicable terms as part of your search query as well.

Now, that I've identified several genetics-related terms, I need to incorporate them into the search query. Using the Boolean OR operator, I'll put these terms in the second search box that I added earlier. Also notice that there is a Boolean AND operator to the left of the second search box. Let's examine the Boolean AND operator in a bit more detail.

Unlike the Boolean OR operator which is more flexible and allows for broadening a search, the Boolean AND operator is much more rigid and helps with narrowing a search. More specifically, the Boolean AND operator requires that each term is included in each of the retrieved results. In this example, you can see that I've included parentheses around each fragment, both the A terms and the B terms, in the search query. You can think of this as being similar to the order of operations principle in algebra. Using this approach, the database searches first for results that include one or more of the A terms. The database will search next for the results that include one or more of the B terms. Lastly, it will combine the two sets of results to identify publications that include at least one of the A terms and at least one of the B terms. You won't see this happen, but you can think of it happening "behind the curtain" within the database's internal environment. These days, however, database designers have improved search

interfaces so that you don't always need to use the parentheses when searching. This is more of a classic approach to searching but it's useful to be familiar with this framework for searching. Let's take a look at how searching is possible without using parentheses.

In this example, you can see that I'm doing the exact same search. However, notice that I'm not using parentheses in Web of Science's search box environment. You might remember from previously slides in the tutorial that I placed the first part of the search query, the A terms, in the top search box, and that I added a second row for the B terms. You can see that reflected here in the search. However, notice that to the left of the second search box there is a Boolean AND operator. By placing each search fragment in its own search box, the database automatically infers the use of parentheses. This is an easier approach to searching, but you must remember to put terms associated with one concept in the first search box and terms associated with the second concept in the second box. This ensures that the database can still continue to utilize the correct order of operations in the search. Understanding the correct use and placement of the Boolean OR and Boolean AND operators in a search query is perhaps the most critical part of being successful in your searching. Understanding this fundamental aspect of searching will likely improve the quality and quantity of your results.

Now that we've covered some of the fundamental aspects of searching a research database, we can begin to apply additional functions that will continue to enhance the quality and quantity of results in our search. In the remaining sections of the tutorial I'll cover the use of quotations, wildcards, and field-specific searching. Let's begin.

To begin, I'm going to discuss the use of quotations which are important for phrase searching. You can think of a phrase as anything that consists of two or more terms. For example, *bos taurus* is one species of domestic cow. If I perform a search that does not enclose *bos taurus* within quotes, the database will interpret this as a search for two independent terms that can be found apart from each other and anywhere in each record of the database. For example, a search for *bos taurus* without quotes will include results that have *bos* in one sentence and *taurus* in another. However, if I enclose *bos taurus* within quotes, this is instructing the database to retrieve only results that include *bos* immediately adjacent to *taurus*. In this example, you can see that not only have I enclosed *bos taurus* within quotes, I have also enclosed single nucleotide polymorphism within quotes. Single nucleotide polymorphism is a phrase consisting of three terms and I want to find each of them immediately adjacent to one another, so I've enclosed them in quotations. Notice in this example that I did not enclose single terms within quotations; it's only the words that I want to find immediately next to one another.

Building on the use of quotations, I'm now going to describe the use of wildcards. Wildcards are operators that also enhance the quality of a search query. Most scientific articles are published in the English language which means that words used can have varying morphologies depending on how the authors used them in their articles. For example, the words genetic and genetically have the same root spelling but differ after the letter C. If I want to find results that include both the singular and plural form of genetic along with the modifier "-ally," I'm going to place an asterisk after the letter C. All three of these words have the same root spelling up to the letter C so by truncating the word here and using the asterisk symbol I can find all three forms of the word in the database. In short, the asterisk symbol is an operator used to find any number of characters creating variant endings of a common root term. I've included several other examples that illustrate the use of the asterisk symbol as a wildcard to enhance my search.

Another important wildcard operator is the dollar sign. This truncation operator is used to find zero to one character after a common root term. For example, the singular form of the word cow has zero characters after the letter W. However, the plural form has one character, the letter S, after the letter W. Similarly, the singular form of the word gene has zero characters after the letter E while the plural form has one character, the letter S, after the letter E. Using the wildcard dollar sign in these circumstances will help you find results that include both the singular and form of a term where the only character differentiating them is a single character. While the wildcard dollar sign is used within Web of Science, a different symbol might be used in other databases to represent this approach to searching. Be sure to consult the database help section to identify the specific symbol used to represent zero to one character after a term.

Additionally, the asterisk is much more commonly used across most research databases so this one is key to remember. If you remember any one wildcard, the asterisk is the one to remember when searching Web of Science and other databases.

Having described the use of Boolean operators along with use of quotations and the wildcards, asterisk and dollar sign, let's look at an example search query that includes all of these elements. In this example, I'm broadly interested in finding publications that might examine how genetic variation could affect the quality or color of meat in one species of domestic cow. Unfortunately, I cannot type that exactly verbatim into the database search box. Instead, I have to construct the question into a search query that the database can understand. You can see that I've placed the terms representing each concept in their own search box. This helps ensure the correct order of operations using Boolean

operators in the search. You can also see that I've utilized quotations and wildcard cards to capture phrases and variant endings of terms. From here, I'm going to modify the search query by switching between a TOPIC and TITLE-field approach to searching.

When searching the database, you might want to alternate between a TOPIC and a TITLE search with your query. In some cases, you might also want to identify publications authored by a specific person. This is when field-specific searching is appropriate. Remember from earlier in this tutorial that I said Web of Science is a searchable collection of records, and that each record contains information describing one publication. Each record has a common set of fields for consistency, and each field contains a specific piece of information describing that publication. For example, a record has a title field, an author field, a publication field, and an abstract field along with several additional fields.

A TOPIC search is the broadest approach to searching. It will search for terms in several fields of each record of the database. These include the following fields: Title, Abstract, Author Keywords, and Keyword Plus®. On the other hand, a TITLE search is much narrower; it restricts the search to look only in the title field of each record for the appearance of the term(s).

Both of these search parameters have advantages and disadvantages and should be used interchangeably to evaluate results. For example, a TOPIC search will retrieve the largest number of results possible; however, that number could be overwhelming, and some results might appear to be more or less relevant than others and to your interests as well. A TITLE search is very narrowly defined and will retrieve fewer results. However, these results could be more closely related to your interests. The downside is that you might miss relevant or perhaps more important publications by relying on this method alone.

So how do I use these approaches to searching for publications about a question that interests me? I use them both interchangeably. Remember, research is iterative. Generally, one search is not going turn up everything you need to find on a topic. It requires patience and persistence, and several different approaches to searching. For example, when starting out, your knowledge about the vocabulary used to describe a question could be limited. As you progress with searching and identifying potential publications, you might acquire new vocabulary along the way. By incorporating new terms into your search process, you'll continue to refine and improve the quality of your search.

I generally begin a search query using the TOPIC search function. However, if I retrieve a large number of results, I might modify the search to search by TITLE. This lessens the number of results and could help

me identify potentially relevant publications. In this example, I have further manipulated the search query to simultaneously search using both the TOPIC and TITLE functions.

Using a combination of these techniques should help improve your searching abilities in Web of Science and beyond. However, what if you're still not finding relevant results? Well, one thing to do is to ask yourself whether you're using the correct terminology. I often find that when searching, I have to identify additional terms as a result of the searches I've done previously. Sometimes, when reading through the first batch of results I'll identify additional relevant or more precise terms that could improve my subsequent search results. You might also review your search query to see if it's constructed correctly. An incorrectly structured search query can affect the outcome of the search results. Also consider that other databases, for example PubMed and Zoological Record, might be more appropriate for your question than Web of Science. Sometimes research occurs in niche fields of study that might not have a wide audience so the journals that publish in those fields might not be as impactful as others. In those cases, it's important to consider other databases that more comprehensively index the literature of those disciplines. Of course, you might also have a novel research question on your hands and there might be limited to no research on it.

Lastly, if you find that you need help, please reach out for assistance. I'll be happy to help you. You can also talk with your instructor who might be able to offer additional techniques or ideas for improving the quality of your search.

Beginning to practice and hone using these techniques can improve your efficiency and efficacy of searching for scientific literature while also improving your understanding of the social and technical complexities associated with searching for information. However, if you have questions or need assistance please feel free to contact me and I’ll be happy to work with you. Thanks for watching.