

**Title:**

PubMed and Boolean Logic Handout

**“PubMed Tutorial for Veterinarians” URL:**

[http://cases.vetmoodle.org/CET\\_CoursePlayer/demo1/public/pubmed.html](http://cases.vetmoodle.org/CET_CoursePlayer/demo1/public/pubmed.html)

**Digital Collection of the documents for the “PubMed Tutorial for Veterinarians”:**

<http://hdl.handle.net/1969.1/158203>

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## PubMed for Veterinarians: A Feline Hyperthyroidism Example

### PubMed and Boolean Logic

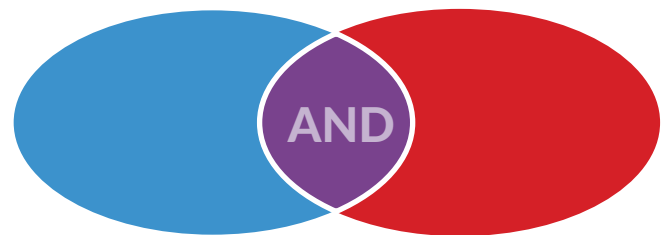
Boolean Logic describes the relationship between search terms. Boolean operators (**AND**, **OR**, **NOT**) define the relationship. This resource illustrates how these three Boolean operators return search results.

#### Boolean Operators:

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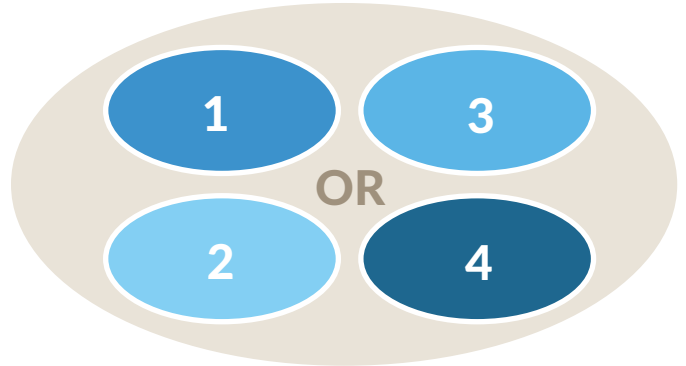
**AND** narrows a search, or part of a search, to be more specific.

In this model, you are searching for blue **AND** red. Blue represents one search term. Red represents one search term. Purple represents results that include both red and blue terms. If you use **AND**, you will retrieve only the purple results.



**OR** broadens a search, or part of a search.

In this model you are searching for shades of blue. Each of these is a different shade of blue, but they are all blue and any would be an acceptable result. Therefore, your results would contain all of the four blue search terms. For Boolean logic, this would look like: blue 1 **OR** blue 2 **OR** blue 3 **OR** blue 4.

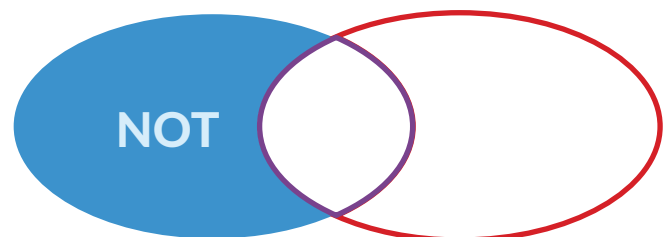


**NOT** eliminates items from your results.

Exercise caution when using **NOT**. You could eliminate a desirable result because it is within the same result as an undesirable result.

Imagine you are searching for blue **NOT** red. In the first example, we illustrated that the purple circle includes both blue **AND** red items in your results.

Blue **NOT** red means the result is missing the items that are red, and items that are both blue **AND** red (the purple circle), so that you have only results that are strictly blue.



## PubMed Boolean Approach:

PubMed automatically uses the **AND** relationship between the terms entered in the home search bar. You can view precisely how PubMed interpreted your search terms in the search details box on the results page.

If you need to change the interpretation of your terms, the PubMed *Advanced Search Builder* allows you to construct a search choosing your own Boolean relationships.

From any PubMed screen with the search box at the top, look below the PubMed search bar for the word **Advanced** and click on it.



This takes you to the PubMed *Advanced Search Builder*. Remember, PubMed automatically connects your search terms with **AND**; however, from this screen you can control for other Boolean options.

Terms you enter on the same line still default to **AND**. For example, cats hyperthyroid is still interpreted as cats **AND** hyperthyroid the same as using the single PubMed search box at the top of most PubMed pages.

A screenshot of the PubMed Advanced Search Builder interface. The page title is "PubMed Advanced Search Builder". At the top, there are navigation links: "PubMed Home", "More Resources", and "Help". The main search area contains a text input field with "cats hyperthyroid" entered. Below the input field are "Edit" and "Clear" links. The "Builder" section has a dropdown menu set to "All Fields" and a text input field containing "cats hyperthyroid". Below this are two more rows, each with a dropdown menu set to "AND" and a text input field. To the right of each row is a "Show index list" link. At the bottom of the Builder section, there are "Search" and "Add to history" buttons. A "History" section is visible at the very bottom. Four numbered callouts (1, 2, 3, 4) point to specific elements: 1 points to the first input field, 2 points to the search terms above the input field, 3 points to the Search button, and 4 points to the Add to history button. Four text boxes provide instructions: "Enter terms here." points to callout 1; "Search terms appear above as you enter them." points to callout 2; "Click Search to go to the results." points to callout 3; and "Click Add to history to stay on this page and view the number of results for each search here." points to callout 4.

To control the Boolean operator, you would type one term into the first field bar, type the next term in the following field bar, and so on.

Here the same search is constructed differently:

We entered cats on the first line and hyperthyroid on the second.

PubMed interpreted the Boolean AND because we added it in the second field bar.

We selected AND between the two search bars to command PubMed how to search.

The screenshot shows the PubMed Advanced Search Builder interface. At the top, the search query is "(cats) AND hyperthyroid". Below this, the "Builder" section shows two search bars. The first bar contains "cats" and the second bar contains "hyperthyroid". Between the two bars, the Boolean operator "AND" is selected. The "History" table below shows the search results for this query.

Search	Add to builder	Query	Items found	Time
#1	<a href="#">Add</a>	Search cats hyperthyroid	451	16:33:22

Below, note the search history. You can see the differences with this second search. In the first search we do not see the **AND** because PubMed inserted it by default. In the second search we see it because we commanded PubMed to use **AND** by using multiple field lines in the Advanced Search Builder.

The History feature is efficient for when we want to create more complex searches and use multiple Boolean operators.

The screenshot shows the PubMed Advanced Search Builder interface. The "Builder" section is empty. The "History" table below shows two search entries. The first entry is "#1" with the query "Search cats hyperthyroid" and 451 items found. The second entry is "#2" with the query "Search (cats) AND hyperthyroid" and 451 items found.

Search	Add to builder	Query	Items found	Time
#2	<a href="#">Add</a>	Search (cats) AND hyperthyroid	451	16:37:54
#1	<a href="#">Add</a>	Search cats hyperthyroid	451	16:33:22

For this final example, below is a possible search for *dirofilaria immitis* (heartworm) in both dogs and cats. There are several components to this search. We need to tell PubMed that we will accept either dogs or cats, but we want *dirofilaria immitis* to be in each result. We need to be careful where the **OR** and **AND** are placed so that we search for ((dogs **OR** cats) **AND** *dirofilaria immitis*) and do not search for ((dogs) **OR** (cats **AND** *dirofilaria immitis*)).

The screenshot shows the PubMed Advanced Search Builder interface. At the top, there are navigation links for 'PubMed Home', 'More Resources', and 'Help'. The main heading is 'PubMed Advanced Search Builder' with a 'History deleted' indicator. The search query is displayed as '((dogs) OR cats) AND dirofilaria immitis'. Below the query is an 'Edit' link and a 'Clear' link. The 'Builder' section shows three rows of search terms: 'dogs', 'cats', and 'dirofilaria immitis'. The first row is selected with 'All Fields'. The second row is selected with 'OR'. The third row is selected with 'AND'. Below the builder is a 'Search' button and an 'Add to history' link. The 'History' section is empty.

On the first line we entered the term dogs.

For the second line we selected the Boolean OR for the term cats.

For the third line, we selected the Boolean AND for *dirofilaria immitis*.

Note how PubMed constructed the search.