

From: [Ana Smith](#)
To: [AMS - GMO Labeling](#)
Subject: bioengineered food consult
Date: Saturday, July 15, 2017 5:24:42 PM

3. Which modifications should AMS consider to be found in nature? (Sec. 291(1)(B))

Modifications that could otherwise be found in nature and therefore must be exempt from the bioengineered rule include:

a) Modifications that involve transferring a small amount of DNA (e.g., a few genes) from one species to another. Interspecies transfer of DNA, even between kingdoms, is found in nature. A brief sample:

- <https://www.ncbi.nlm.nih.gov/pubmed/28645486>
- <https://www.ncbi.nlm.nih.gov/pubmed/27406565>
- <https://www.sciencedaily.com/releases/2007/03/070308220454.htm>
- <https://www.scientificamerican.com/article/how-bacteria-passes-dna-t/>
- <http://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1005502>
- <http://www.pnas.org/content/112/18/5844.abstract>
- <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0074590>
- <https://phys.org/news/2016-04-scientists-document-rare-dna-animals.html>
- <https://www.ncbi.nlm.nih.gov/pubmed/28360923>
- <https://www.ncbi.nlm.nih.gov/pubmed/27234293>
- <https://www.ncbi.nlm.nih.gov/pubmed/26051213>
- <https://www.ncbi.nlm.nih.gov/pubmed/25090479>
- <https://www.ncbi.nlm.nih.gov/pubmed/23542649>
- <https://www.ncbi.nlm.nih.gov/pubmed/22690978>
- <https://www.ncbi.nlm.nih.gov/pubmed/21334091>
- <https://www.ncbi.nlm.nih.gov/pubmed/27030977>
- <https://www.ncbi.nlm.nih.gov/pubmed/26709836>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4987893/>

b) Modifications that involve transferring a large amount of DNA from one species into another. Since interspecific hybrids occur in nature, any modification or breeding process that introduces a comparable scale of genetic changes into a new plant variety should be exempted.

- <https://link.springer.com/article/10.1007/s10457-004-2028-2>
- <https://www.ncbi.nlm.nih.gov/pubmed/27091174>
- <https://www.ncbi.nlm.nih.gov/pubmed/28455588>
- <https://www.ncbi.nlm.nih.gov/pubmed/28448798>

- <https://www.ncbi.nlm.nih.gov/pubmed/28295812>
- <https://www.ncbi.nlm.nih.gov/pubmed/27178066>

c) All herbicide resistance traits. Herbicide resistance develops routinely through natural mechanisms whenever selection pressure is applied. For example:

- <https://www.ncbi.nlm.nih.gov/pubmed/24307186>
- <https://www.ncbi.nlm.nih.gov/pubmed/20192743>
- <https://www.ncbi.nlm.nih.gov/pubmed/19743401>
- <https://www.ncbi.nlm.nih.gov/pubmed/15668922>
- <https://www.ncbi.nlm.nih.gov/pubmed/28703943>
- <https://www.ncbi.nlm.nih.gov/pubmed/25180399>
- <https://www.ncbi.nlm.nih.gov/pubmed/24482320>

d) As illustrated by the evolution of herbicide resistance mentioned above, all types of organisms have a remarkable (if sometimes slow) natural ability for adaptation in the face of selection pressure. Any trait that could reasonably be expected to be observed in an organism (given sufficient time for the species to naturally adapt to selection pressure) should be considered to be “a modification that could otherwise be found in nature.”

- <https://www.ncbi.nlm.nih.gov/pubmed/15739260>
- <http://www.cabi.org/cabebooks/ebook/20053001658>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3227405/>
- <https://www.ncbi.nlm.nih.gov/pubmed/17894755>
- <https://www.ncbi.nlm.nih.gov/pubmed/17259228>
- <https://www.ncbi.nlm.nih.gov/pubmed/21536479>
- <https://www.ncbi.nlm.nih.gov/pubmed/20860683>
- <https://www.ncbi.nlm.nih.gov/pubmed/28476688>