Bioinformatics: Food Detective

*Answers*

# TASK ONE

**Table 1:** Complete table using BLAST results

\*Note the results with high E-values can change from day-to-day depending on updates to the NCBI database

|  |  |  |  |
| --- | --- | --- | --- |
| **Sequence** | **Species – *scientific name*** | **Species – common name** | **E-value** |
| A | *Sus scrofa* | Pig | 1e-48 |
| B | *Selar crumenophthalmus* | Bigeye scad (fish) | 0.002 |
| C | *Sus scrofa* | Pig | 1e-48 |
| D | *Bos taurus* | Cattle | 6e-47 |
| E | *Sus scrofa* | Pig | 3e-50 |
| F | *Tursiops truncatus* | Bottlenose dolphin | 0.033 |
| G | No significant similarity found*.* | N/A | N/A |
| H | *Ovis aries* | Sheep | 6e-47 |
| I | *Sus scrofa* | Pig | 3e-50 |
| J | *Homo sapiens* | Human | 5e-48 |
| K | *Scinax sp. 2 LFSRF-2021* | Snouted tree frog | 0.011 |
| L | *Gallus gallus* | Chicken | 1e-48 |
| M | *Neomerinthe hemingwayi* | Spinycheek scorpionfish | 0.002 |

Note: E-values may vary slightly, due to daily updates to the sequence database.

**QUESTION 1:** What do your results in **Table 1** tell us about the DNA in the sausage? Does the meat seem to be 100% pork?

**The meat is not absolutely 100% pork (pig). At least some DNA of cattle, sheep and human is also present in the sausage.**

**QUESTION 2:** Do any of your results seem unexpected? Explain.

**Yes, since the sausage is 100% pork, we expected only pig DNA to be present. Instead, we found DNA sequences for sheep, cattle, chicken and human as well.**

**QUESTION 3:** Compare the E-values of sequences in Table 1 to each other. Are all of the results equally reliable? Are these results surprising?

**Some results have much higher E-values. These indicate less reliable matches to DNA sequences. These results are not surprising, because matches with higher E-values have no really plausible way to be present in a sausage. Here we can exclude some results, e.g anything that is not pig, cattle, chicken, sheep or human. How do we explain the presence of these other animals in the sausage?**

**QUESTION 4:** Are your results ***really*** unexpected? Think about how sausages are made and how DNA is extracted.

**It is not too surprising that other species’ DNA sequences are found in the sausage. Chicken, cattle and sheep products (i.e. chicken, beef and lamb) are also prepared and stored in the butcher’s shop. Also, sausage meat is commonly mixed by hand, potentially explaining the traces of human DNA. Humans extracted the DNA from the sausage, so there may have been some contamination with human DNA during that process. Even the smallest traces of DNA can be picked up in the DNA extraction and sequencing processes.**

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