



# Genomic Mapping of Adaptive Changes in Food and Environmental-borne *Salmonella* for Identification of Preventative Controls

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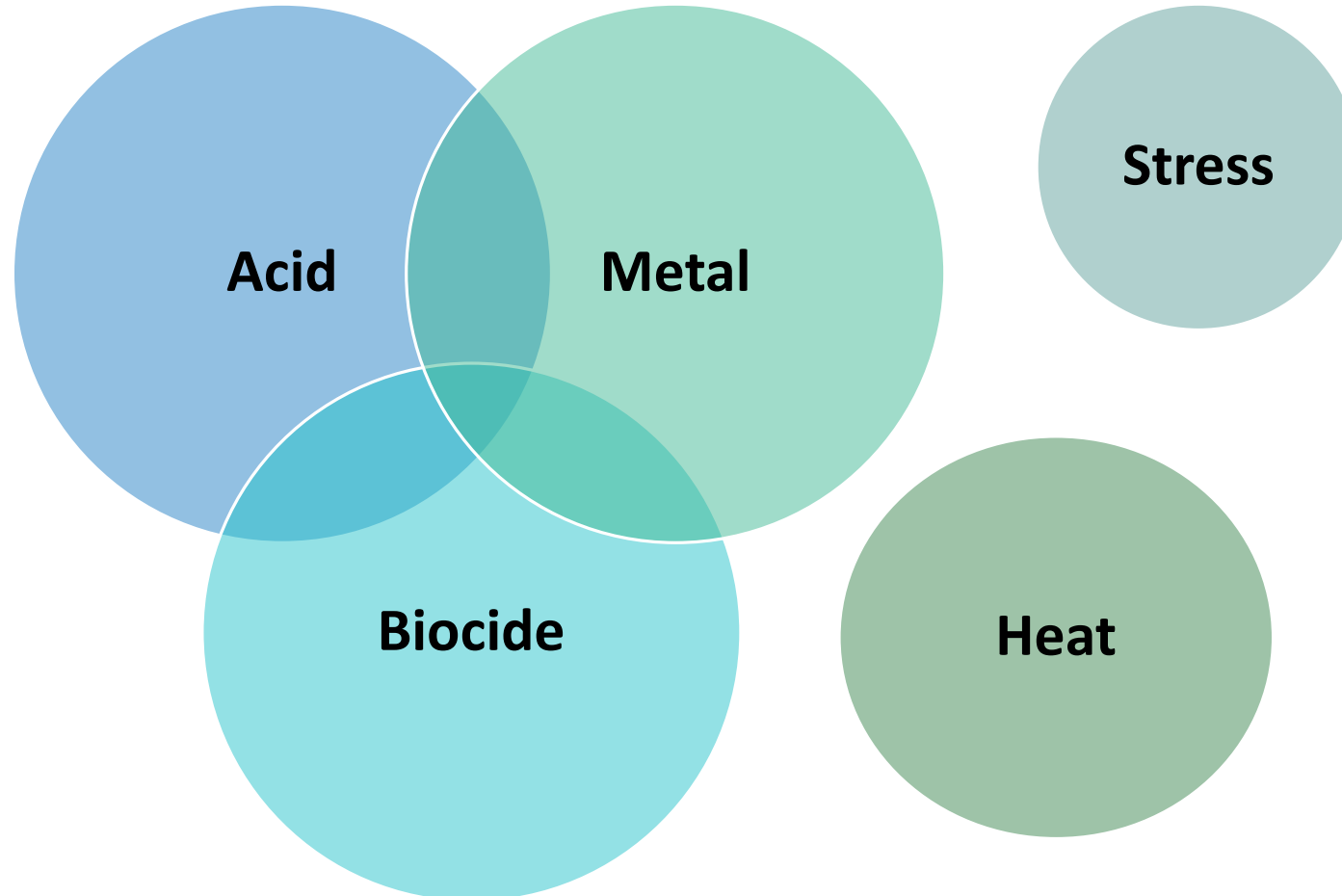
# Background

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- Genetic adaptations observed in *Salmonella* associated with food production and processing environments is a public health concern.
- These genetic adaptations can be responsible for desiccation tolerance, heat tolerance, biocide resistance, and biofilm production among other things.
- Identification of these adaptations are of high importance to industry and regulatory agencies and can play a role in risk assessments and appropriate methods for clearance of a strain.

# Database of Adaptation Genes

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# Screening of all GenomeTrakr Isolates

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- Genes BLAST with the parameters of 90% Identity and 50% coverage.
- Total Genomes Blasted:
  - *Salmonella sp.*: 129,962
  - *Escherichia coli*: 30,451
  - *Shigella sp.*: 6,542
  - *Campylobacter sp.*: 16,924
  - *Listeria monocytogenes*: 15,902
  - *Vibrio sp.*: 680

Average Gene Hit Percentage

60.0%  
50.0%  
40.0%  
30.0%  
20.0%  
10.0%  
0.0%

	Heat	Metal	Acid	Biocide
■ Campylobacter	0.0%	1.6%	5.3%	2.4%
■ Cronobacter	50.4%	7.8%	0.0%	0.0%
■ Escherichia	1.0%	36.9%	52.8%	33.9%
■ Listeria	0.0%	0.6%	0.0%	0.8%
■ Salmonella	0.1%	13.7%	7.3%	7.7%
■ Shigella	0.0%	35.6%	49.8%	32.2%
■ Vibrio	0.0%	0.0%	21.4%	12.9%





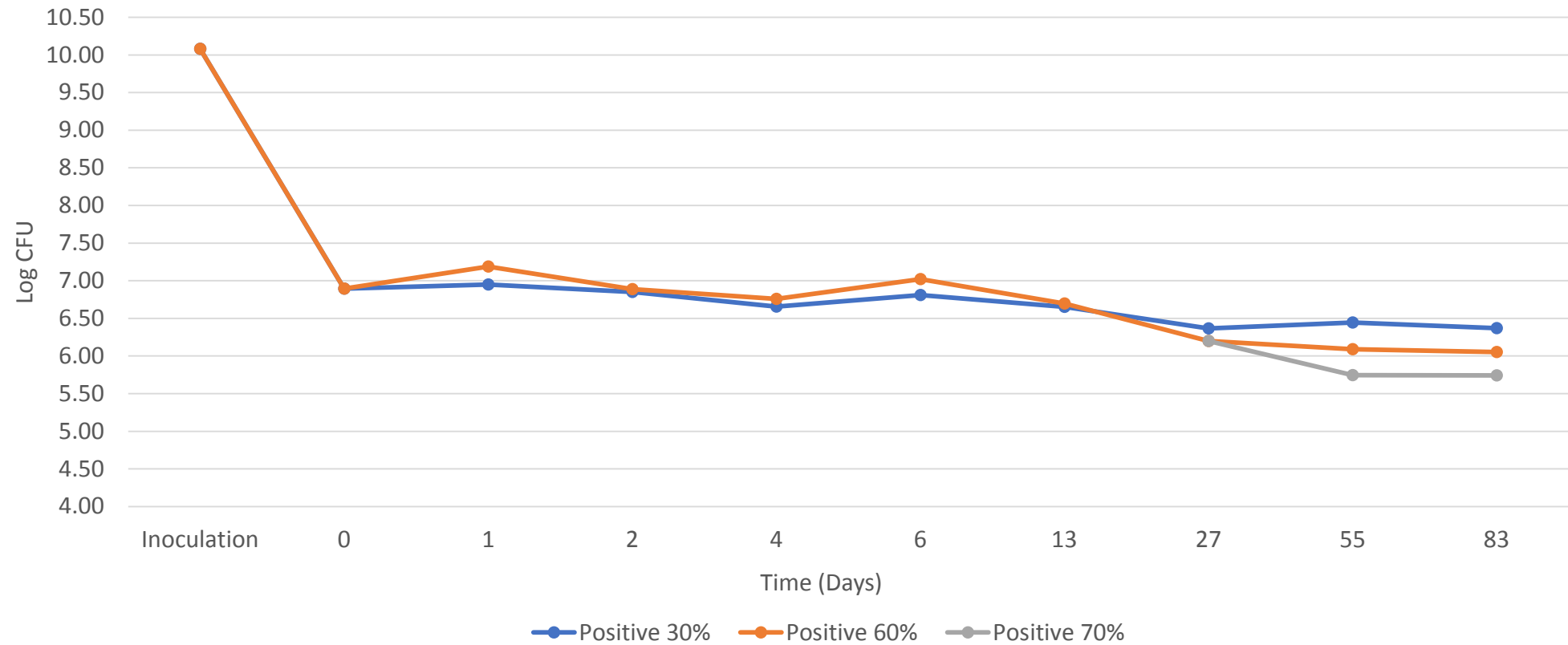
# Survival Studies

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- *Salmonella* cocktails made of different serovars used to inoculate pistachios and flour.
- Inoculated food stored at different relative humidity (~30%, 60%, and 70%)
- Samples taken at different time points and total *Salmonella* counts from direct plating.
- DNA extracted from overnight enrichment and sequenced on the MiSeq using Nextera DNA Flex Library preparation kit.
- Subset of DNA sequenced using the Oxford MinION.

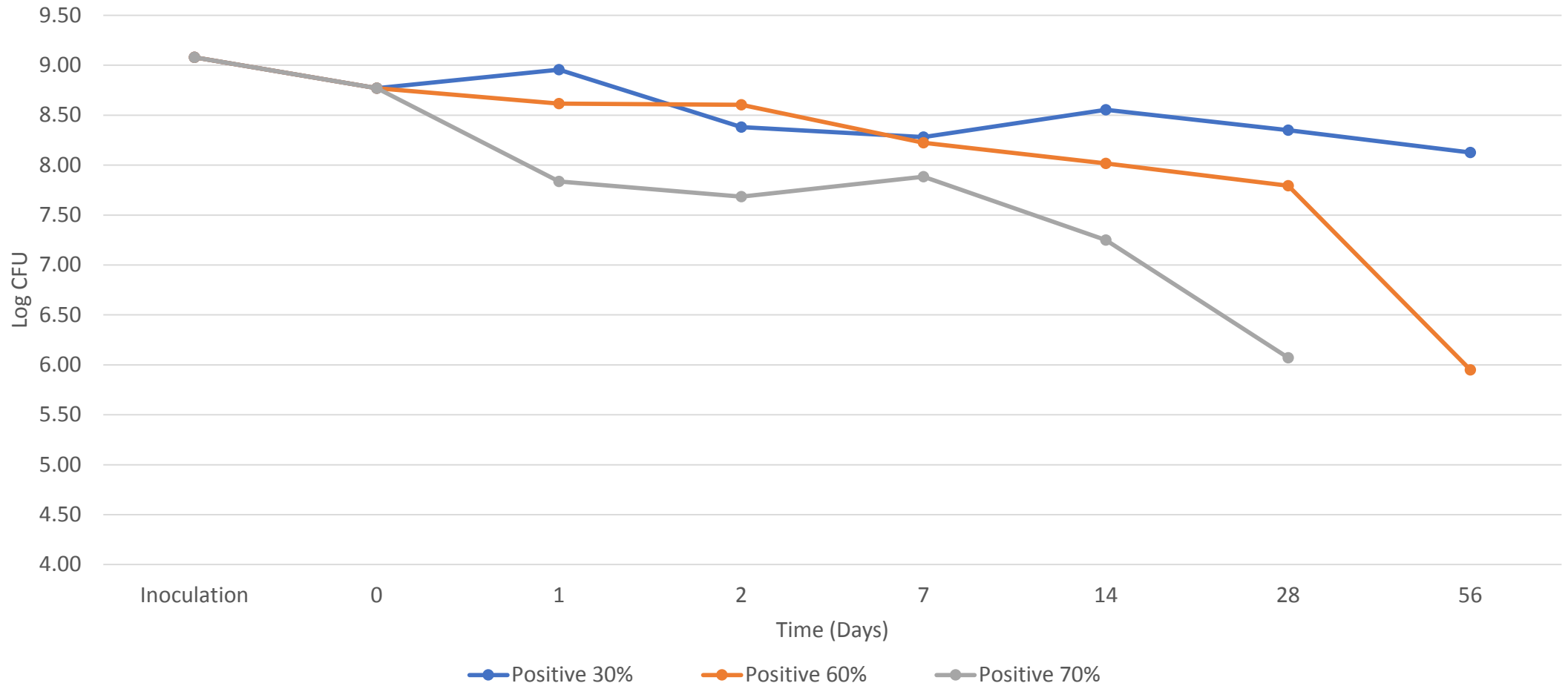


# Survival Graph of *Salmonella* in Pistachio





# Survival Graph of *Salmonella* in Flour







# Future Work...

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- Metagenomic Data Analysis to see which serovars in the cocktail is surviving.
- Test *Salmonella* survival in Peanut Butter.
- RNA-expression studies, TraDIS Sequencing, MIC Testing for biocide tolerance



# Thank you to everyone:

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