

Technological University of Cyprus

**Department of Agricultural Science, Biotechnology and Food
Science**



Master Thesis

**Detection of food-borne viruses on ready-to-eat meat
products and meat processing establishments in
Cyprus**

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Science

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Approval Form

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The approval of the master thesis by the department of Agricultural Science, Biotechnology and Food Science of the Technological University of Cyprus does not suggest acceptance of the ideas of the author by the department.

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Abbreviations

CP	Capsid Protein
cre	Cis-acting Replication Element
CDC	Control Center of Disease and Prevention
CO₂	Carbon Dioxide
DLP	Double-Layered Particle
ER	Endoplasmic Reticulum
eIF	Eukaryotic translation Initiation Factor
FAO	Food and Agriculture Organization
FCV	Feline Calicivirus
GG	GenoGroup
GDPH	Glyceraldehyde-3-Phosphate Dehydrogenase
HAV	Hepatitis A virus
hnRNP	human heterogeneous Ribonucleoprotein
HBGA	Histo-Blood Group Antigen
HEV	Hepatitis E virus
IAC	Internal Amplification Control
IRES	Internal Ribosome Entry Site
IFN-γ	Interferon-γ
NoV	Norovirus
NaCl	Sodium Chloride

NTP	Nucleotide Triphosphate
NSP	Non-Structural Protein
ORF	Open Reading Frame
PBS	Phosphate Buffered Saline
qPCR	Quantitative Polymerase Chain Reaction
PABP	Poly(A) Binding Protein
PTB	Poly Pyrimidine Binding Protein
PCBP	Poly(C) Binding Protein
PV	Poliovirus
RT	Reverse Transcription
RdRp	RNA-dependent RNA polymerase
RF	Release Factor
RV	Rotavirus
ss(+) RNA	Single Stranded positive sense RNA
SL	Stem Loop
TLP	Triple-Layered Particle
TGBE	Tris-Glycine Beef Extract
UTR	Untranslated Region
VPg	Virion Protein genome-linked
VP	Viral Protein
WHO	World Health Organization

Abstract

Food-borne viruses are able to contaminate and persist on food, therefore causing disease and in some occasions even death among the exposed population. The major food-borne viruses are NoV, RV, HAV and HEV, causing acute gastroenteritis (NoV,RV) and acute hepatitis (HAV,HEV). The economic burden of food-borne viral infections is also very important for the food industry, because contamination will result to withdrawal and destruction of products. The involvement of food products in large outbreaks of acute gastroenteritis and hepatitis has let scientists around the world to categorize food stuffs with higher risk. Vegetables, fruits, shellfish and ready-to-eat products have been involved in several food-borne outbreaks of acute hepatitis and gastroenteritis. Viruses found on such products, which can be eaten raw or partially cooked, can remain active until consumption, therefore are in higher risk. Ready-to-eat meat products such as ham, salami and bacon can be contaminated with viruses, by infected handlers during the process of packaging. In Cyprus, no study has attempted to record the prevalence of food-borne viruses in animal origin products and establishments yet. Therefore, in this pilot study, ready-to-eat meat products and establishments of two meat-processing plants in Cyprus have been analysed for the presence of NoV, RV, HAV and HEV, using RT-qPCR. The meat products analysed were ham, bacon, salami, hiromeri and lountza. Additionally, swabs from the two establishments were also analysed, including processing equipment (slicing machine, trimming machine, scales), toilet handles and workers hands. The slicer machine and the hand of a handler from plant B were found to be positive to NoV. Contamination of ready-to-eat meat products just before packaging can result to public health threats, since the products usually are consumed raw without any further processing. The results of this study disclose the dangers for public health by food-borne viruses and set the foundations for further examination of this issue.