

resources:																			DHF: version 4 Date 03/06/2022	
Traceability Matrix		Project Name: Food Freshness																		
Item #	User Needs	Item #	Design Inputs (Technical Requirement)	Acceptance Criteria		Design Outputs	Design Verification (Outputs = Inputs)	Design Validation (User Needs Met)												
				Ideal	Limit															
1 Customer Requirements (e.g. Functional)																				
1.1	Evaluates meat product freshness/spoilage	1.1.1	Accuracy of temperature measurement (sensor sensitivity) 99%	99%	95%															
		1.1.2	Records temperature fluctuation within the container when temperature changes for at least 0.2 °C after 1 minute time increment	0.2	0.5															
		1.1.3	Stops recording as soon as product reaches spoilage stage																	
		1.1.4	1MB memory, can store 125,000 datapoints, about 87 sampling days if sampling every minute.	90 days	45 days															
1.2 Intuitive for an average consumer to use with little or no instruction																				
		1.2.1	Device comes with clear instructions																	
		1.2.2	Only three buttons	2 buttons	4 buttons															
		1.2.3	User can understand how to use device in less than 5 minutes	3 mins	7 mins															
1.3 Compact and fits in common family food storages																				
		1.3.1	Total volume doesn't exceed 20cm x 20cm x 20 cm																	
1.4 Simple visual feedback of spoilage risk																				
		1.4.1	Digital interface capable of outputting 3 statuses based on sensor input, smiley face for fresh, neutral face for starting to spoil, and frowning face for spoiled																	
		1.4.2	Sensitivity and specificity of spoilage status estimation	99/99	95/90															
1.5 Cost is less than value of saved food over lifetime																				
			Device cost is at most \$30	\$25	\$35															
1.6 Easy to clean																				
			Material XXX																	
			Can be put through dishwasher 100 times	Withstands 150	Withstands 100															
2 Product Performance Requirements (e.g.Mechanical)																				
2.1 Reusable																				
		2.1.1	Can be used repeatedly for 2 years without breaking or losing function.	3 years	2 years															
		2.1.2	Restart button to reset freshness monitoring.																	
2.2 Minimally invasive to food product																				
		2.2.1	Contact area, if any, should be below 1 cm^2	0.5 cm^2	1 cm^2															
		2.2.2	Penetration depth should be inversely proportional to contact area. The larger the contact area, the less deep it should penetrate																	
2.3 Rapid result feedback																				
			Should take as long as a normal digital thermometer would: 40 seconds	30 seconds	1 minute															
2.4 Functional at freezing temperatures																				
			Fully functional and physically/chemically safe at temperature range 32° F - 100° F	0° F - 100° F	32° F - 100° F															
2.5 Water resistant, dust protected																				
			Meets Ingress Protection Code IP55 standard.																	
		2.5.1	Level 5: Dust protected																	
		2.5.2	Level 5: Water jets																	
2.6 Wireless																				
		2.6.1	Commercially available replaceable battery																	
		2.6.2	Battery lasts for a minimum of a month.	5 weeks	2 weeks															
		2.6.3	Battery is no larger than 2cm x 2cm x 4cm.	1.5cm x 1.5 cm x 3cm	2.5 cm x 2.5 cm x 4.5 cm															
3 Does not change biochemical, minimal physical properties change on product																				
3.2 Does not change biochemical, minimal physical properties change on product																				
			Food contact material made of FDA cleared material.																	
4 Regulatory Requirements																				
4.1 Safe material for interaction with food and human.																				
			Material is listed in FCS list by FDA: Packaging & Food Contact Substances																	
5 Interfaces with Other Systems																				
5.1 Visual interface suitable for people with color blindness or visual limitations																				
		5.1.1	Area of light/screen should be large enough for people with heavy myopia to observe (X cm by X cm).																	
		5.1.2	Information display must use colors easily distinguishable by people with color blindness.																	
5.2 Operatable with minimal physical interaction																				
		5.2.1	Less than 45 N force required to open container lid.	30 N	60 N															
		5.2.2	Less than 10 N force required to press button to start freshness monitoring.	5 N	15 N															
		5.2.3	Size of button to start monitoring freshness must be greater than 1.5 mm x 1.5 mm x 1.5 mm.																	
6 Other																				