Food Safety Agent-Based-Simulator Facility (FS-ABS-F) Control Table			
ID	**Type of Monitor or Controls Class**	**Functionality**	**Run Action or Example**
Run Controls: These are responsible for starting, pausing, and stopping the experiment			
Setup	Button Control	• Push to Execute • Set up variables and global • Clear all • Reset Time	Momentarily
Next	Button Control	• Push to Execute • Forward only one iteration • Iteration length 0.33s	Momentarily
Go	Button Control	• Push to Execute • Perpetually Forward one iteration • Push to stop	Forever unless otherwise (set to stop after processing is complete when no agents in the facility)
Input Mass: Future event scheduler (Our input arrivals are determined here)			
Mass-to-Process	Slider Control	• Set the number of lettuce heads to process • Mass unit is kg • Range from 22 to 1620 kg • Increment size is 0.5kg	Once the set amount to process is reached our input arrivals stop coming
Input contamination controls: Future event scheduler (controls introduce contamination into the system)			
probability-Of-Contamination	Slider Control	• When lettuce arrives this probability setting will determine whether it's contaminated or not based on the set probability. • Range from [0 to 1]	For example, if the probability is set to 0.1 this means 1 in 10 of the incoming lettuce heads are contaminated
Contamination-Level	Slider Control	• After the lettuce head is determined to be contaminated based on *Probability-Of-Contamination* you would need a level of contamination which is this setting. • Range from -12 to 6 logCFU/g	For example, if 1 in 10 of the lettuce is said to be contaminated and the **contamination-level** is set to 2 logCFU/g, the contaminated lettuce will have 2 logCFU/g
SD	Slider Control	• The *Contamination-Level* is usually an estimated parameter with a mean and standard deviation, meaning this parameter is normally distributed. • +/- logCFU/g	For example, if the *Contamination-Level* is set to 2 logCFU/g and the SD is set to 0.5. The **contamination-level** will most likely be in this range 2 +/- 0.5 logCFU/g
iceberg-to-romaine	Slider Control	• Two breeds of lettuces iceberg and romaine • Probability chance of lettuce being	For example, if the slider is set 0 means all the arriving lettuces are ice-berg. If the slider is 0.2,

			romaine range from 0 to 1	80% of arriving is iceberg and 20 % is romaine.
Partitioning: *Lettuce and lettuces pieces will be cut into bits and more pieces*				
Manual-Trim_#	Slider Control	• Reference 4.4.2.4 Manual Trim [L2] • Range from 0 to 3 partitions • Number of lettuces pieces after partitioning Manual-Trim_# + 1	For example, if the setting is 1, the number of lettuce pieces after L2 is 1 + 1 = 2
Shred_#	Slider Control	• Reference 4.4.2.5 Shredding [L3] • Range from 0 to 3 partitions • Number of lettuces pieces after partitioning Shred_# + 1	For example, if the setting is 3, the number of lettuce pieces after L3 is the pieces after L2 * (3 + 1) = 2 * 4 = 8
Temperature Controls: *These controls are responsible for temperature variation*				
Set-Temperature	Slider Control	• The **Set-Temperature** is the mean ambient temperature of the facility. • Reference supplement equation 1 below • *Set-Temperature = Set-T* • *Range from 7 to 32*	The average temperature of the room
Temp-Offset	Slider Control	• The **Temp-Offset** is the range parameter max and min. • Reference supplement equation 1 below • *Temp-Offset = Temp − Off* • The range of Temp-Offset is from 0 to 3 because the range for the temperature in the Baranyi growth missing equation number model is from 4 to 35	The range of temperature of the room
Temp-Oscillation-Speed	Slider Control	• The **Temp-Oscillation-Speed** is how quickly we desire the temperature to change.	
Temperature Supplement Equation: $$Current\ facility\ temperature = SetTemp + TempOffset * sin\left(\frac{\pi * time}{TempOscSpd}\right) \qquad [1]$$ The temperature profile used in many dynamic models resembles some sinusoidal function reference **figure 4.8**				
Equipment Surface Contamination: *These controls are responsible for bacteria on equipment surfaces*				
Cross_Contamination ?	Switch Control	• The process of cross-contamination reference process chapter 3 can be turned on and off for the entire	For example, if the switch is in the on position cross-contamination will take place, if

		process equipment.	off nothing will happen even if there is bacteria present on the equipment surface
Allow-Initial-Contamination-of-patches	Switch Control	• The choice to introduce contamination on the equipment before running as an initial condition. • Initial condition Setup parameter	Does not affect the cross-contamination process, if turned on slidder controls*: L1-nc, L1-LC, L2-nc, ……., L4-LC* become active
L1-nc	Slider Control	• Depends on ***Allow-Initial-Contamination-of-patches*** switch in on position • There are five L1 workers • Range 0 to 5 workers	For example, if ***Allow-Initial-Contamination-of-patches*** is turned on and *L1-nc* is set to 3. Three workers are randomly selected to be contaminated out of the five.
L1-LC	Slider Control	• Depends on ***Allow-Initial-Contamination-of-patches*** switch in on position and *L1-nc* greater than zero • Range 0 to 4 logCFU/patch	For example, if *L1-nc* is set to 3 and *L1-LC* is set to 2. Three of the five workers that are contaminated will be contaminated with 2 logCFU
L2-nc	Slider Control	• Reference *L1-nc* • Range 0 to 15 in location L2	Reference *L1-nc* except three patches will be randomly selected to be contaminated out of the fifteen.
L2-LC	Slider Control	• Reference *L1-LC*	Reference *L1-LC*
L3-nc	Slider Control	• Reference *L1-nc* • Range 0 to 36 in location L3	Reference *L1-nc*
L3-LC	Slider Control	• Reference *L1-LC*	Reference *L1-LC*
L4-nc	Slider Control	• Reference *L1-nc* • Range 0 to 136 in location L4	Reference *L1-nc*
L4-LC	Slider Control	• Reference *L1-LC*	Reference *L1-LC*
Wash tank Controls: *These controls are responsible for the wash-tank*			
allow-transfer-in-water	Switch Control	• The process of bacteria transfer in the wash tank reference process chapter 3 can be turned on or off for the entire process duration.	For example, if the switch is in the on position transfer will take place, if off nothing will happen even if there is bacteria present in lettuce. The links in the wash tank are left ineffective and there is no log reduction due to the water.
Allow-Chlorination	Switch Control	• The process of chlorination in the wash tank reference process chapter 3 can be turned on or off for the	For example, if the switch is in the on position transfer will take place, if off nothing will happen

		entire process duration.	even if there is bacteria present in lettuce. The links in the wash tank are left ineffective
R-1	Global Input	• The first dose of free chlorine at the beginning of the experiment usually 21 mg/L from Luo reference process chapter 3.	
R-2	Global Input	• The second dose of free chlorine after 12 min usually 10 mg/L from Luo reference process chapter 3.	
R-3	Global Input	• The second dose of free chlorine after 24 min usually 10 mg/L from Luo reference process chapter 3.	
Collect-TIT	Switch Control	• Collect-TIT stands for Collect Time In Tank • When this is switched on the time in tank for each lettuce head that has gone through the tank is save in a list from there the average time in tank is determined	
Misselenious: Experimental designs used for experiments and others			
Experiment -Buchholz	Switch Control	• To activate simulation by Buccholz switch to on.	22.5 kg lettuce heads first enter the system followed by 22.5 kg contaminated lettuces and finally 90 kg
Contaminat ion-Buchholz	Slider Control	• Works similar to Contamination-Level but this will only apply to the 22.5 kg contaminated lettuce • Values 2 4 6 logCFU/g • Active when *Experiment-Buchholz* is on	For example, if set to 2, the 22.5 kg contaminated lettuce heads in the Buchholz experiment will each have 2 logCFU/g
Baseline	Switch Control	• To activate simulation by Buccholz switch to on. • Note you can't run Buchhols and Baseline at the same time program is designed to automatically switch to Buchholz if you press Setup and switch to Baseline if the user presses Go or Next	
Probability -BL	Slider Control	• Works similar to **Probability-Of-Contamination** but this will only apply baseline experiment Will over-ride **Probability-Of-**	

		Contamination if *Baseline* is active/on	
Contamination-BL	Slider Control	• Works similar to *Contamination-Level* but this will only apply to baseline experiment • Will over-ride Contamination-Level if *Baseline* is active/on	
ask-patches	Slider Control	• Works similar to L1-nc but in this case the number of equipment patches is from L1 to L4 the equipment surfaces before wash • Will over-ride *Allow-Initial-Contamination-of-patches* if *Baseline* is active/on	For example, if it's set to 0.1will mean 10% of the combined 192 patches from L1 to L4 will be randomly contaminated
ask-patches-2	Slider Control	• Works similar to L1-nc but in this case the number of equipment patches is from L6 to L7 the equipment surfaces after wash • Will over-ride *Allow-Initial-Contamination-of-patches* if *Baseline* is active/on	For example, if it's set to 0.1will mean 10% of the combined 615 patches from L6 to L7 will be randomly contaminated
p-L1-to-L4-lc	Slider Control	• Works similar to *L1-LC* this is the level of contamination on L1 to L4 surfaces.	
p-L6-to-L7-lc	Slider Control	• Works similar to *L1-LC* this is the level of contamination on L6 to L7 surfaces.	
p-sd-1	Slider Control	• This will introduce standard deviation on the level of contamination to *p-L1-to-L4-lc*	
p-sd-2	Slider Control	• This will introduce standard deviation on the level of contamination to *p-L6-to-L7-lc*	
Activate-Label	Switch Control	• If switched on the level of contamination in each agent will be shown.	
QC-Max-LogCFU	Slider Control	• When counting good bags and bad bags after packaging this is the threshold or quality control parameter with the minimum acceptable level of contamination	
Threshold	Slider Control	• The acceptable minimum level of safety in logCFU/g	For example, if set to -2 logs means less than threshold 1/100

			cfu/g is considered safe
Change-Size	Slider Control	• We can double the size of the lettuce, it is only for aesthetics purposes	

Food Safety Agent-Based-Simulator Storage (FS-ABS-S) Control Table			
ID	**Type of Monitor or Controls Class**	**Functionality**	**Run Action or Example**
Run Controls: These are responsible for starting, pausing, and stopping the storage and the facility simultaneously			
Setup	Button Control	• Reference Setup in FS-ABS-F • In addition: ▪ Starts the processing facility and the storage simultaneously ▪ Parent control: controls both models.	Momentarily
Next	Button Control	• Reference Next in FS-ABS-F • In addition: ▪ Forward one iteration storage and forward one iteration processing facility simultaneously ▪ Parent control: controls both models.	Momentarily
Go	Button Control	• Reference go in FS-ABS-F	Reference go in FS-ABS-F
Temperature Controls: These controls are responsible for temperature variation in storage only			
Set-Temperature	Slider Control	• Reference *Set-Temperature* in FS-ABS-F	Reference *Set-Temperature* in FS-ABS-F
Temp-Offset	Slider Control	• Reference *Temp-Offset* in FS-ABS-F	Reference *Temp-Offset* in FS-ABS-F
Temp-Oscillation-Speed	Slider Control	• Reference *Temp-Oscillation-Speed* in FS-ABS-F	Reference *Temp-Oscillation-Speed* in FS-ABS-F