

**Table S1:** Production of FS cheeses and datasets.

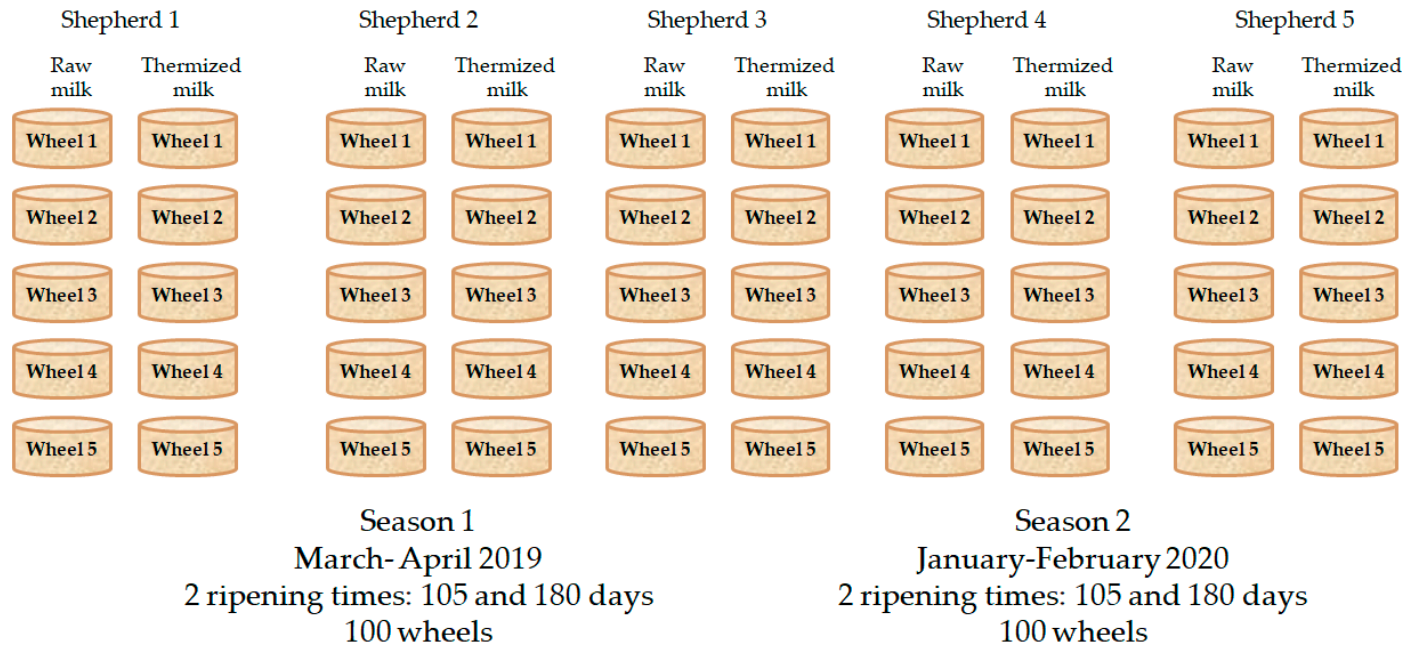
	Production	Treatment	Analysis	FS samples		
Dataset 1	5 Shepherds (two seasons)	Raw; Thermization 68°C 60 s	MRI; Image analysis	S1	→	RC HTC
				S2		
				S3		
				S4		
				S5		
Dataset 2	13 Industrial samples	n.a.*	MRI; Image analysis	I1-13		

\*n.a. not applicable

**Table S2** Moisture content (M = Mean; SD = Standard Deviation, expressed as %: g water / 100 g sample) of shepherds (from raw milk = RC; from heat-treated milk = HTC) and industrial samples (I1-13). I12 and I13 refer to cheeses from Maturer industry.

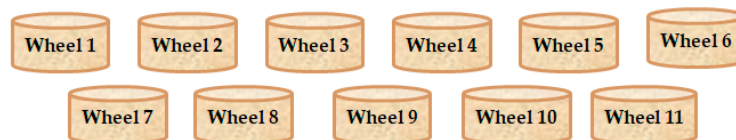
Artisanal Samples								Artisanal Samples								Industrial Samples							
Season 1								Season 2															
105 days				180 days				105 days				180 days											
RC		HTC		RC		HTC		RC		HTC		RC		HTC				M	SD	M	SD		
M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	I1	32.95	0.26	I8	36.22	0.14
S1	42.07	0.26	40.78	0.49	28.91	3.7	29.98	0.93	33.90	1.52	39.50	1.17	28.96	1.49	35.45	3.24		I2	42.73	0.1	I9	35.33	0.03
S2	32.83	2.93	36.24	0.99	36.96	0.42	35.86	1.47	40.01	0.40	38.51	1.60	37.27	1.52	35.68	1.16		I3	36.42	0.22	I10	37.72	0.04
S3	41.89	0.44	36.24	1.44	39.34	0.43	32.59	1.84	37.08	2.22	38.43	1.57	35.01	0.85	33.33	0.96		I4	32.80	0.04	I11	38.15	0.13
S4	33.09	0.92	36.75	1.76	30.26	2.85	32.43	1.10	39.04	1.35	37.10	0.61	37.84	0.92	33.17	1.81		I5	37.74	0.13	I12	26.22	0.04
S5	35.98	0.88	37.14	0.68	32.61	1.04	31.81	2.00	29.66	1.48	40.82	0.83	23.99	0.89	37.83	0.25		I6	32.33	0.06	I13	27.99	0.27
																		I7	38.45	0.25			

## Artisanal samples



## Industrial samples

(purchased)

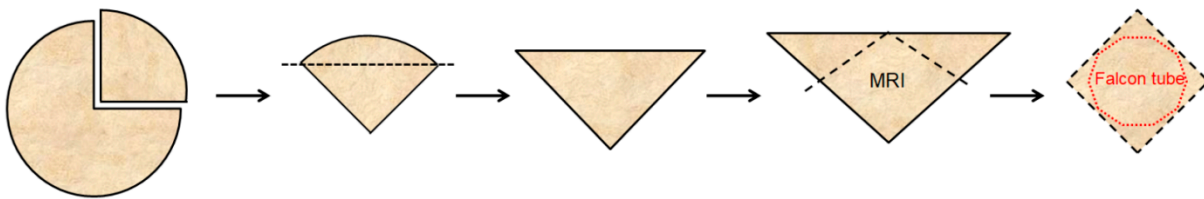


## Maturer samples

(purchased)



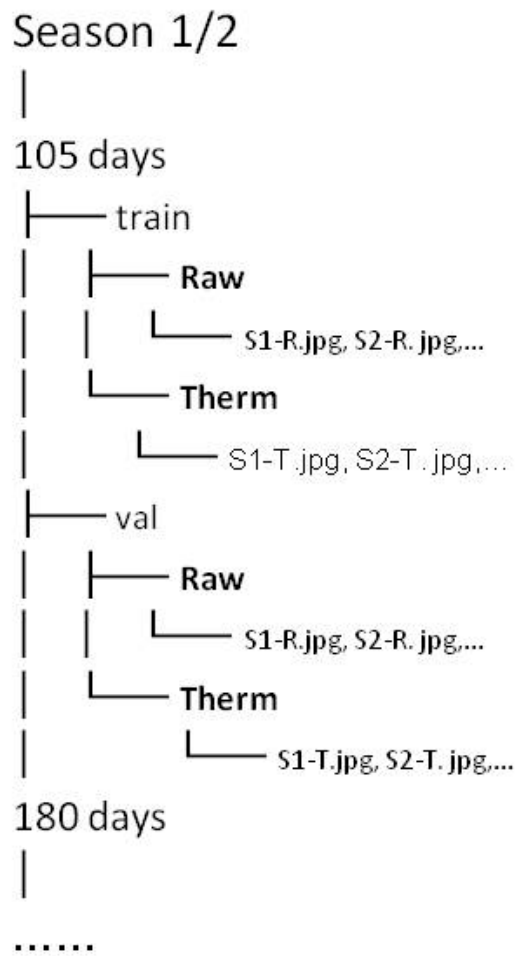
**Figure S1.** Schematic representation of the sample production and sampling plans. Raw milk refers to RC samples, Thermized milk refers to HTC samples.



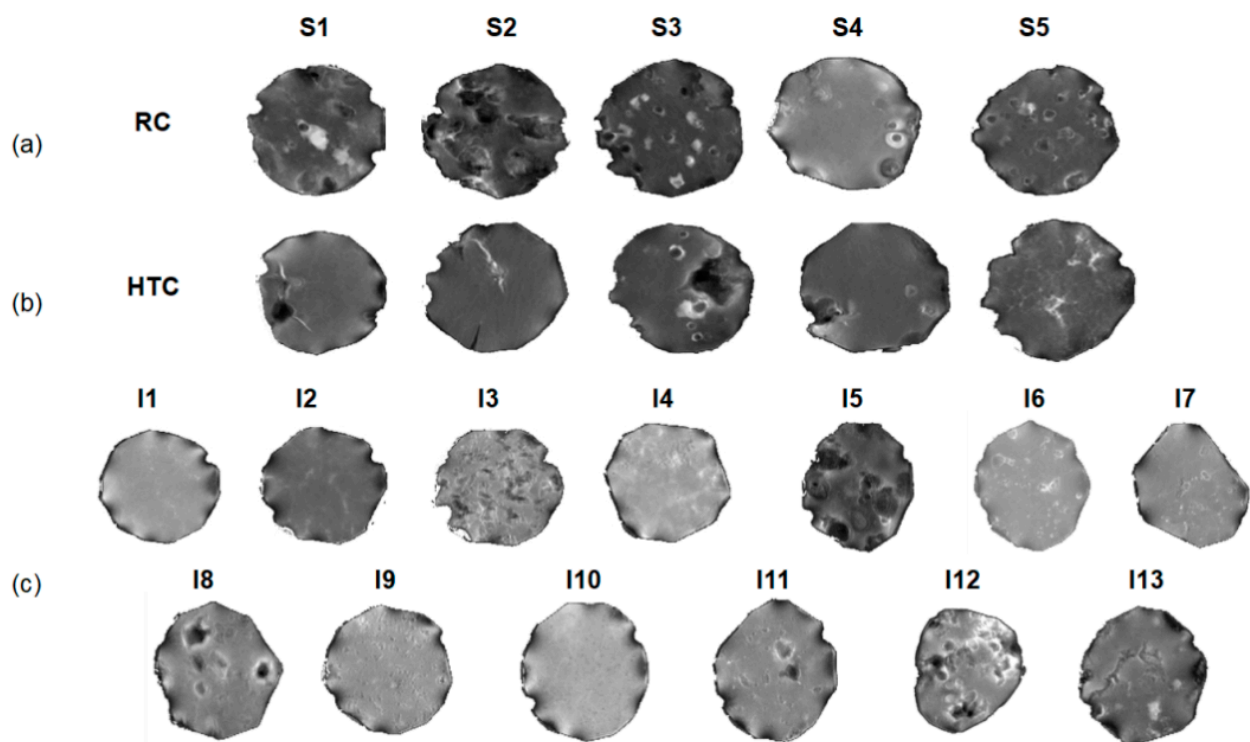
**Figure S2:** Sampling from each wheel of FS cheese for MRI analysis.



**Figure S3.** Computer Vision System (CVS) used to acquire Fiore SARDO cheese surface images.



**Figure S4.** Tree diagram representing Image Dataset Directory and File Structure used for ML and DL classifications of MRI and photos datasets.



**Figure S5.** Representative T<sub>2</sub> weighted MRI images of Fiore Sardo cheeses made using either raw milk (a) or thermized milk (b); Industrial samples (c). I12 and I13 are FS samples from a maturer industry. Images refer to a selected 1mm slice of a ~2 cm-diameter cylinder at the centre of each cheese wheel sample.

**Table S3.** Performance and classification results obtained by Resnet, AlexNet, VggNet, SqueezeNet, DensNet and Inception-Net pre-trained DL frameworks on MRI T<sub>2</sub>-weighted images for classification of Dataset 1 according to cheese-making practice (RC and HTC); Average % values of accuracy and loss (for training and validation step) and training time resulted from average of five replicate runs for each model are showed.

		ResNet	AlexNet	VggNet	SqueezeNet	Densnet	Inception-Net	
Season 1	105 days	Training Accuracy (%)	90.20	88.02	82.40	98.00	80.40	88.20
		Training Loss (%)	2.60	6.69	4.44	0.70	3.83	4.88
		Validation Accuracy (%)	97.00	93.90	97.00	100.00	0.818	100.00
		Validation Loss (%)	0.80	5.45	1.36	0.34	2.62	0.169
		Training Time	13 m 29 s	12 m 50 s	17 m 32 s	14 m 25 s	17 m 50 s	20 min 14 s
	180 days	Resnet	AlexNet	VggNet	Squeezenet	Densnet	Inception-Net	
		Training Accuracy (%)	87.20	91.50	93.60	95.70	89.40	87.20
		Training Loss (%)	3.26	2.63	0.274	0.24	2.30	3.67
		Validation Accuracy (%)	100.00	100.00	94.00	100.000	100.00	100.00
		Validation Loss (%)	0.55	0.06	0.77	0.24	0.37	1.11
	Training Time	14 min 30 s	15 min 23 s	14 min 45 s	14 m 22 s	17 m 32 s	20 m 15 s	
Season 2	105 days	ResNet	AlexNet	VggNet	SqueezeNet	Densnet	Inception-Net	
		Training Accuracy (%)	77.20	79.20	81.20	93.80	87.10	86.20
		Training Loss (%)	4.29	17.25	4.69	1.17	3.60	4.91
		Validation Accuracy (%)	92.70	76.50	92.70	100.00	94.10	94.30
		Validation Loss (%)	2.50	12.03	1.66	0.05	2.06	1.16
	180 days	Training Time	18 m 5 s	16 m 53 s	24 m 19 s	17 m 50 s	24 m 45 s	18 min 41 s
		Training Accuracy (%)	86.60	78.00	78.00	95.40	90.00	72.00
		Training Loss (%)	3.97	9.76	9.80	0.08	2.38	77.40
		Validation Accuracy (%)	87.50	100.00	100.00	100.00	96.90	96.90
		Validation Loss (%)	4.29	0.001	0.06	0.01	1.12	1.57
	Training Time	13 min 6 s	15 min 30 s	17 min 50 s	16 m 48 s	17 m 52 s	19 min 17 s	

**Table S4 .** Performance and classification results obtained by Resnet, AlexNet, VggNet, Squeezenet, Densenet and Inception-Net pre-trained DL frameworks on photographic images of Fiore Sardo surfaces of Dataset 1 (Season1, 105 days of ripening) in order to obtain classification according to cheese-making practice (RC and HTC). Average % values of accuracy and loss (for training and validation steps) and training time are resulted from average of five replicate runs for each model are showed.

	ResNet	AlexNet	VggNet	SqueezeNet	Densenet	Inception-Net
Training Accuracy (%)	82.20	74.00	86.00	96.00	90.00	74.00
Training Loss (%)	5.09	1.54	3.68	1.46	2.96	6.09
Validation Accuracy (%)	96.70	100.00	96.90	100.00	96.80	93.80
Validation Loss (%)	0.80	0.08	0.08	0.23	0.06	0.10
Training Time	74 m 30 s	74 m 20 s	75 m 40 s	68 m 38 s	65 m 59 s	69 min 36 s