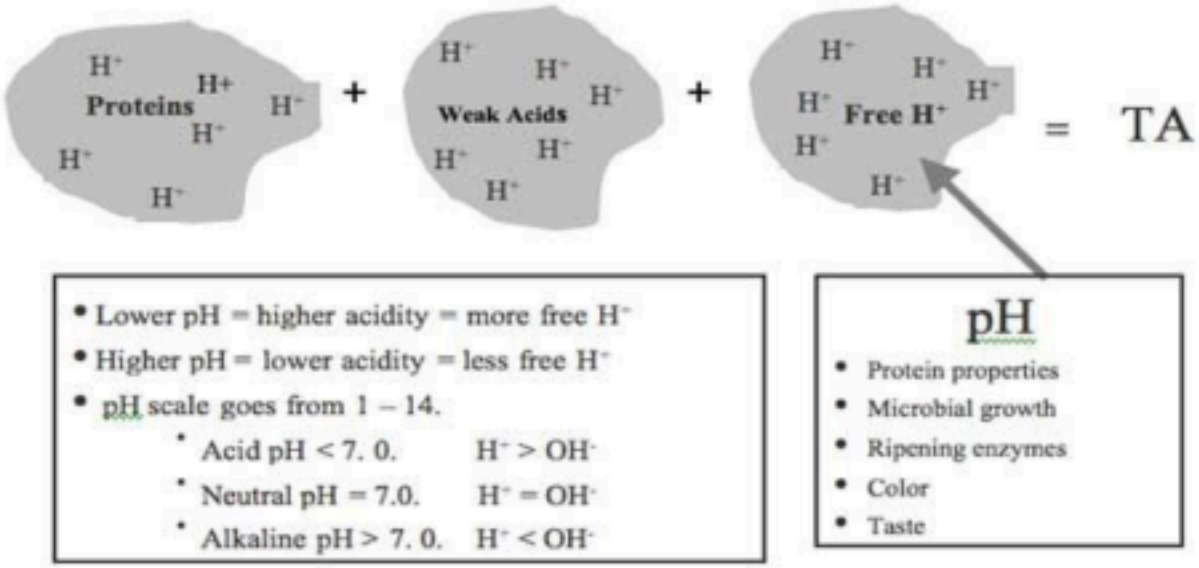
pH vs Time									
Operations	Swiss		Gouda		Cheddar		Cheddar		Fe
	type				MNFS 53%				MN
	Time	pH	Time	pH	Time	pH	Time	pH	Time
Add starter	0	6.6	0	6.6	0	6.6	0	6.6	0
Add rennet	15	6.6	35	6.55	60	6.55	30	6.55	75
Cut	45	6.55	70	6.5	90	6.5	75	6.5	115
Drain or dip into forms	150	6.35	100	6.45	210	6.2	195	6.3	130
Milling	NA	NA	NA	NA	360	5.4	315	5.45	NA
Pressing	165	6.35	130		420	5.35	390	5.4	NA
Demoulding	16 hr	5.3	8 hr	5.4	24 hr	5.2	10 hr	5.2	24 hr
Minimum pH	1 wk	5.2	1 wk	5.2	1 wk	5.1	1 wk	5.1	1 wk
Retail	6 mo	5.6	6 mo	5.6	24	5.5	4 mo	5.3	6 wk

Table 1. Typical pH versus time profiles for several cheese varieties Time is in minutes unless other wise noted. MNFS means moisture as a percentage of the nonfat substance of the cheese. Dr Hill

Figure 1. Natural fermentation of raw milk: **A to B**. At the natural pH of milk (6.6–6.8) and temperatures greater than 20



Appendix 1. Cheese Safety 101 Part 4. The concept of pH.

Proteins and weak acids in milk act as reservoirs for hydrogen (H^+) and hydroxyl (OH^-) ions. When acid is added the eq

Protein properties (stretchabiltiy, meltability, hardness, brittleness), color, growth of spoilage and pathogenic bacteria, a

	Cottage	
pH	Time	pH
6.6	0	6.6
6.5	60	6.5
6.4	300	4.8
NA	360	5.0
NA	NA	NA
NA	NA	NA
4.6	NA	NA
4.4	NA	NA
4.4	2–14	5.2

)°C, lactic acid bacteria (LAB) rapidly ferment milk sugar (lactose) to lactic acid. Most other bacteria are lactose intolerant. Lac

uilibrium shifts to the left as free hydrogen ions associate more with proteins and weak acids. Conversely, when base (hydrox

nd activity of cheese ripening enzymes are all dependent on the pH history of the cheese.

:tic

yl ions) is