

Table 7-1. Resistances of various electrical pathways through the cow¹

Pathway	n ²	Resistance		Current	References
		Mean (ohms)	Range (ohms)	Frequency (Hz)	
Mouth to all hooves	70	350	324-393	60	Craine et al. 1970
	28	361	244-525 ³	60	Norell et al. 1983
Mouth to rear hooves	28	475	345-776 ³	60	Norell et al. 1983
Mouth to front hooves	28	624	420-851	60	Norell et al. 1983
Front leg to rear leg	5	300	250-405	60	Lefcourt, 1982
	13	362	302-412	60	Lefcourt et al. 1985
Front to rear hooves	28	734	496-1152 ³	60	Norell et al. 1983
Rump to all hooves	7	680	420-1220	50	Whittlestone et al. 1975
Chest to all hooves	5	980	700-1230	50	Whittlestone et al. 1975
	?	1000	?	50	Woolford, 1972
Teat to mouth	28	433	294-713 ³	60	Norell et al. 1983
Teat to all hooves	28	594	402-953	60	Norell et al. 1983
	4	880	640-1150	50	Whittlestone et al. 1975
Teat to rear hooves	28	594	402-953 ³	60	Norell et al. 1983
Teat to front hooves	28	874	593-1508	60	Norell et al. 1983
All teats to all hooves ⁴	6	1320	860-1960	50	Whittlestone et al. 1975
	?	1000	?	50	Phillips et al. 1963
Udder to all hooves	12	1700	650-3000	60	Henke Drenkard et al. 1985

¹ Adapted from Appleman and Gustafson (1985b).

² Number of animals.

³ Ranges given are for 10-90% percentile, or percent of cows with measured resistance between the reported limit.

⁴ Measured during milk flow.

It is impossible to quantify the total circuit impedance for all conditions and situations. For evaluation purposes, it is often sufficient to consider the worst case impedance, i.e., the lowest circuit impedance possible, and a more realistic impedance, i.e., the lowest circuit impedance likely to be encountered. For the worst case circuit impedance, the assumption is made that the source and all path impedances are zero, an extremely unlikely occurrence. The worst case impedance then becomes the sum of the contact and animal impedances. From experimental tests and field experience, we consider 500 ohms to be a very conservative estimate of this worst case impedance.

Table 7-2. Estimates of worst case and realistic circuit impedances for translating currents to voltages

	Impedances (ohms)		
	Path + Source	Contact + Animal	Total
Worst case	0	500	500
Realistic	500	500	1000