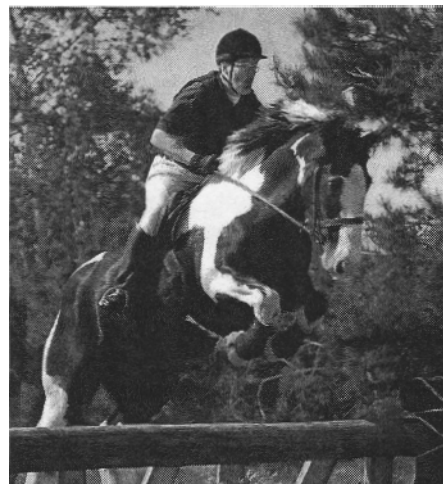


BACKWASHINGS

Firstly a big "Thank You" to those Water SG members who sponsored me on a charity ride at Tweseldown. The event is organised annually by the Lions in aid of the Riding for the Disabled Association. RDA is a national organisation that provides free riding for disabled children. Riding improves the children's balance and coordination and strengthens their muscles. Just as important it builds their confidence and self-esteem. Your contributions are greatly valued.



I was recently asked about variations in water hardness and how they affect the performance of endurance horses. Endurance is about completing a course of up to 100 miles in the fastest possible time whilst maintaining the horse in a sound condition, displaying no signs of physical stress. It's an arduous sport and horses do die of exhaustion. Dehydration is a key factor, with the horse losing up to 10 l/h of sweat. Equine sweat glands are different from human sweat glands, with the result that horses lose more sodium, chloride, potassium and calcium in their sweat than we do. This means that the electrolyte balance (and the hardness) of their drinking water is more important than it is to us. Because they lose a lot of salt in their sweat, the rate of accumulation in their extracellular fluid is low, and they don't get thirsty even when they need water. Which is why you can lead a horse to water but can't make it drink.

Time was when hardness was measured in degrees Clark, named after Prof Thomas Clark of Aberdeen University who invented the lime softening process. He was granted a patent in 1841 for *A New Mode of Rendering Certain Waters (including the Thames) Less Impure and Less Hard, for the Supply and Use of Manufactories, Villages, Towns and Cities*, without which we wouldn't have had the Lancashire boiler. (For the benefit of any younger readers, one degree Clark is one grain per gallon as CaCO_3). Then we moved on to mg/l. But now, thanks to Bill Gates, we have new units.

You've almost, certainly, come across these Gatesian units, which are a feature of tables in Word. The units are typed in as mg/l or mm and are automatically converted to Mg/l and Mm and so on. Rather frustratingly it's only the units and not their values that are converted, but I'm sure that feature will be provided in the next version of Word. The Mg/l, or mega-gramme per litre, is big so a moderately hard water might have a total hardness of, say, 2.4×10^{-11} Mg/l and a magnesium ion concentration of 3×10^{-10} MgMg/l. The Gatesian mega-metre (Mm) is 1000km, so perhaps Mg/Mm³ would be a more reasonable size? Or maybe not, I think it's 10^{-3} ng/l, which is pretty small.

This conversion is all done after you shut your computer down. The same software goes through PowerPoint files converting p into m, causing embarrassment when you're talking about pore sizes in microns and the slide clearly shows millimetres. And, of course, there's pH. In 1909 Sorensen coined the symbol pH from the French *puissance d'Hydrogène* (literally power of hydrogen - power in the sense of ten to the power something) but I'm sure that, few British and no American scientists ever understood this, let alone thought it either useful or even interesting, so the Gatesian Ph is clearly much more sensible, although confusing to electrical engineers, who work only at 1 Ph or 3Ph.

The other thing it does is to reset your spelling checking programme to something called American English. (*American English*; what the Hell is that? English is a language. You don't have Italian Chinese or German Urdu - er, do you?) You may have thought, like me, that the differences were confined to spelling, but no! They've changed the whole meaning of words. My attention was caught by a Spokesman for the US Government being interviewed on *Today* about Airbus' move to compete with Boeing for smaller planes and, in particular, the possibility that Airbus might get state financial assistance which would give them an unfair advantage (the Americans were never protectionist, were they ... But I digress). As part of his tirade against Airbus' capabilities he said "Good engineering doesn't necessarily make good economics." Now had he said "Good technology doesn't necessarily make good economics", I could possibly agree, but good engineering, by definition, is good economics - at least it is in UK English.