

WORKING WITH BACTERIAL GROWTH YIELDS AND GROWTH RATES

OK, so the simple formula for calculating YIELDS is:

$$N_t = N_0 \times 2^g$$

where:

N_t is the number of cells at time t

N_0 is the starting number of cells

g is the number of generations that occurred

t is the elapsed time

If you know the doubling time (t/g), usually expressed as hours or minutes per generation, given a length of time t , you can simply calculate the number of generations that occur.

Now, if you do an experiment and measure N_0 and N_t (and of course you took note of the time), how do you calculate the DOUBLING TIME?

First, you convert the above equation to give number of generations (g) based on the starting and ending numbers of cells. By dividing both sides by N_0 you get:

$$N_t/N_0 = 2^g$$

Now if you were good at \log_2 you could solve this easily - it would be

$$\log_2(N_t/N_0) = g,$$

but most of us think in terms of \log_{10} , so you can either look in your old math book or take it from me that this translates into

$$[\log_{10}(N_t/N_0)]/\log_{10}2 = g$$

of course, you remember that the $\log_{10}2 = 0.301$, so the formula roughly becomes

$$[\log_{10}(N_t/N_0)]/0.3 = g$$

g/t is the growth rate, and t/g is the doubling time.