HOW TO SOLVE PRACTICAL ASPECTS OF MICROBIOLOGY

5. CALCULATION OF INOCULUM SIZE

Inés Arana, Maite Orruño & Isabel Barcina

Department of Immunology, Microbiology and Parasitology
University of the Basque Country
Universidad del País Vasco (UPV/EHU)
OCW 2013
5. CALCULATION OF INOCULUM SIZE

Often it is necessary to know the initial cell density of a culture, for example when we wish to determine the growth characteristics of a microorganism, or for the industrial production of certain compounds.

This situation is reflected in the following diagram:

From a culture with a density of A cells/ml, X ml are transferred to a new flask to obtain a final cellular density of B cells/ml. The problems, with more or less complexity, are always reduced to this scheme: we want to know the densities of A or B flasks or the volume of inoculum.

To solve these problems, it is important to note that if a flask (B) has a volume of 100 ml and a density of $10^6$ cells/ml, the total number of cells in the flask will be $10^8$ cells (density x volume). These $10^8$ cells have been transferred in X ml (inoculum). The volume of this inoculum depends on the density of the initial culture (A).

This scheme will be useful to solve problems like the following one:

5.1. From a bacterial culture with a density of $2.25 \times 10^7$ cells/ml, we have inoculated a flask containing 1.5 liters of sterile culture medium. If the volume used as inoculum has been 10 ml, which is the bacterial density in the flask?
5.1. Density into the flask?

**Cellular density?**

\[ 2.25 \times 10^7 \text{ cells/ml} \]

**A = 2.25 \times 10^8 \text{ cells transferred}**

\[ \frac{2.25 \times 10^8 \text{ cells}}{1,500 \text{ ml}} = 1.5 \times 10^8 \text{ cells/ml} \]