Depending on their requirements, bacteria need different media solutions to be grown in the laboratory:

- **Agar media**
  - A nutrient jelly
  - Most bacteria and fungi are grown on agar
  - It is *commercially available* (Oxoid, Biomerieux)
  - The exact composition of it is known
  - In more complex agar media, the exact composition is a company secret
    - This is used to grow fastidious organisms

- **Selective media**
  - This *inhibits* the growth of some bacteria while allowing others to thrive
  - Two examples are Brilliant Green Agar and Eosin Methylene Blue
    - The dyes *inhibit the growth of Gram-positive bacteria*
    - It is *useful for culturing GI bacteria* as they are Gram-negative

- **Differential media**
  - This *differentiates* between different organisms growing on the same plate
  - An example is *blood agar*
    - This is agar with *5% sheep’s blood* or *defibrinated horse blood introduced* into it
    - It is used to *differentiate* between species of *Streptococci*

Scientists may also have to count the bacteria on an object, this may be to test:

- **Disinfectant testing**
- **The minimum inhibitory concentration of antibiotics**
- **Food (such as an aerobic colony count)**

Different methods are available to count bacteria:

- **Total cell count**
  - It is quick but has several limitations:
    - Does not distinguish living and dead cells
    - Small cells are hard to count
    - Precision is difficult to achieve
    - Not suitable for low density samples, <10^6 cells per cm^3
    - Motile cells have to be immobilised
  - An automated analyser can be used

- **Viable cell count**
  - This is sensitive and selective
  - Each cell can yield one colony
  - Spread plates or pour plates can be used
  - However, the bacteria must be able to survive 45°C molten agar
  - Serial dilutions are used for food testing
  - Doubling dilutions for disinfectant testing
  - 30-300 colonies per plate are counted

- **Total dry cell weight**
  - This can give an *estimate* depending on the weight of one bacteria

- **Amount of cellular component**
  - Similar to the dry weight, the *amount of protein etc.* available in the sample will give an indication to the number of cells

- **Bacterial inoculum size**
  - This is *important* for antibiotic testing

Bacteria counting comes with many errors however:

- **Suitability of the culture**
- **Length of incubation**
- **Pipetting errors**
- **Human errors and cell clumping**