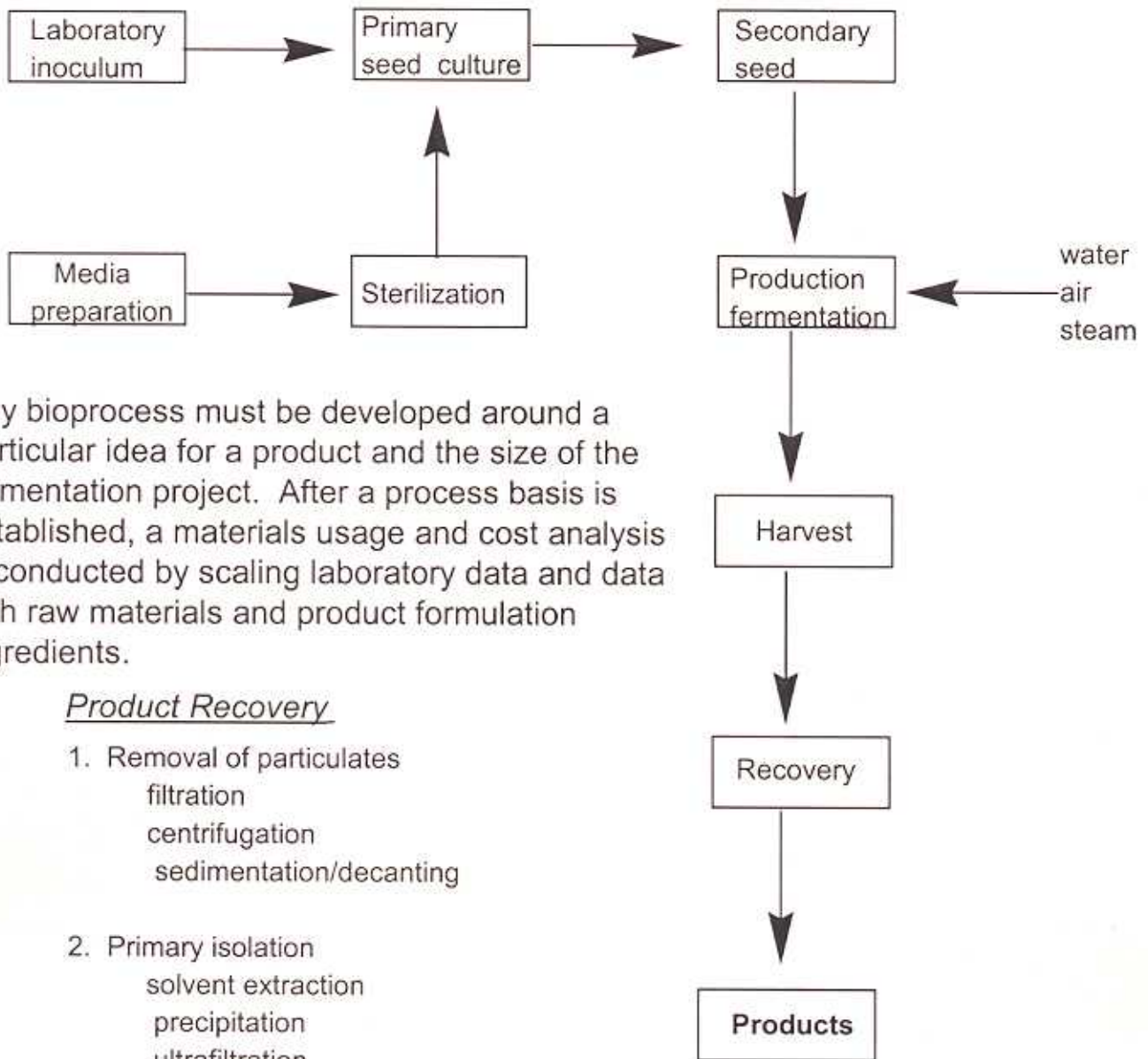


# FERMENTATION PROCESS FLOW DIAGRAM



Any bioprocess must be developed around a particular idea for a product and the size of the fermentation project. After a process basis is established, a materials usage and cost analysis is conducted by scaling laboratory data and data with raw materials and product formulation ingredients.

## Product Recovery

1. Removal of particulates
  - filtration
  - centrifugation
  - sedimentation/decanting
2. Primary isolation
  - solvent extraction
  - precipitation
  - ultrafiltration
3. Purification
  - fractional precipitation
  - chromatography
  - adsorption
4. Final product isolation
  - crystallization
  - lyophilization