Claims

1. A method to produce a crystalline lactose, wherein said lactose is produced via a biotechnological production process, wherein said biotechnological production process is a fermentation process, a bioconversion process or an enzymatic process, wherein said method comprises a step of drying and/or crystallisation of said lactose.
2. The method according to claim 1, wherein said lactose is purified by purification steps selected from a microfiltration step, a centrifugation step, an ultrafiltration step, a nanofiltration step, an ion exchange step, a Simulated Moving Bed step, a colour removal step, a step of removal of sucrose, glucose or trehalose by addition of yeast, a step of removal of trehalose by addition of trehalase, a step of removal of sucrose by addition of an invertase; and preferably further comprises a concentration step; preferable said ion exchange step is a cation and/or anion exchange step, and/or a mixed bed ion exchange step.
3. The method according to claim 1, wherein i) said fermentation or bioconversion is followed by a biomass removal step, preferably said biomass removal step comprises a step of centrifugation, microfiltration and/or ultrafiltration; and/or ii) cells removed from said fermentation or bioconversion are reused in a further fermentation or bioconversion process.
4. The method according to claim 1, wherein said biotechnological production process is an enzymatic process and wherein at least one enzyme is immobilised and/or wherein the reaction is performed between 50°C and 80°C, preferably between 55°C and 70°C.
5. The method according to claim 1, wherein i) said fermentation process or bioconversion process is performed at a temperature between about 25°C and about 50°C, preferably between about 25°C and about 40°C; ii) enzymatic conversions are performed by at least one enzyme produced by a cell synthesizing said enzyme; and/or iii) said biotechnological production process is a fermentation process characterised in that said lactose is produced by a cell genetically engineered to produce all enzymes necessary for production of lactose.
6. The method according to claim 1, wherein said method comprises a step of crystallization, said crystallization comprising cooling, cooling to ≤45°C, cooling to from about 20°C to about 25 °C and/or seeding.
7. The method according to claim 1, wherein said lactose is purified from the biotechnological production process resulting liquid comprising sucrose, glucose, trehalose, fructose, and/or glycerol.
8. The method according to claim 2, wherein the lactose purity before purification is < 70%, < 60%, < 50%, < 40%, < 30%, < 20%, < 10% on total solids, and/or the purity at the end of said method comprising purification is higher than > 80% on dry solids, preferably > 85% on dry solids, more preferably > 90% on dry solids, even more preferably > 95% on dry solids, even more preferably > 97% on dry solids, even more preferably > 98% on dry solids, most preferably > 99% on dry solids.

9. The method according to claim 2, wherein said purification of an enzymatically produced lactose comprises a step of a microfiltration or ultrafiltration to recover the used enzymes.
10. The method according to claim 1, wherein said biotechnological production process comprises i) a step of nanofiltration to remove/reduce monosaccharides and/or salts; ii) a step of ion exchange to remove charged materials; and/or iii) a concentration step.
11. The method according to claim 1, wherein said lactose has an ash content below 1% on total solid, preferably below 0.5% on total solid, preferably with one or more of:
    a) Lead content lower than 0.1 mg/kg solid, preferably lower than 0.02 mg/kg solid;
    b) Arsenic content lower than 0.2 mg/kg solid, preferably lower than 0.02 mg/kg solid;
    c) Cadmium content lower than 0.1 mg/kg solid, preferably lower than 0.01 mg/kg solid; or
    d) Mercury content was lower than 0.5 mg/kg solid, preferably lower than 0.1 mg/kg solid.
12. The method according to claim 1, wherein said lactose has at least one or more of: i) a protein content below 100 mg per kg dry solid, ii) DNA content below 10 ng per gram dry solid and iii) endotoxin content below 10000 EU per gram dry solid.
13. The method according to claim 1, wherein said lactose crystals are dried by band drying, belt drying, vacuum band drying, vacuum belt drying, drum drying, vacuum drum drying, roller drying, vacuum roller drying and other types of drying.
14. The method according to claim 1, said step of drying comprises any one or more of spray drying, lyophilization, evaporation, precipitation, spray freeze drying, freeze spray drying, band drying, belt drying, vacuum band drying, vacuum belt drying, drum drying, roller drying, vacuum drum drying, vacuum roller drying, and agitated thin film drying.
15. The method according to claim 1, wherein said crystalline lactose is produced for use i) in a food or feed preparation, in a dietary supplement, in a cosmetic ingredient, in a pharmaceutical ingredient, in medicine, for use in prophylaxis or therapy of a gastrointestinal disorder, or ii) as additive in food, as additive in human food and/or pet food, as additive in infant food, infant formula, infant supplement, human baby food, animal milk replacer, veterinary product, post weaning feed, or creep feed.