

WHAT IS CLAIMED IS:

1. A method of deriving a mammalian livestock pluripotent stem cells line, the method comprising:

(a) *ex-vivo* culturing a mammalian livestock embryo of at least 7 days post-fertilization for a culturing period of at least 4 days and no more than until 21 days post-fertilization so as to obtain an embryo comprising epiblast cell and/or late stage pluripotent stem cell;

(b) isolating from said embryo said epiblast cell and/or said late stage pluripotent stem cell, and

(c) culturing said epiblast cell and/or said late-stage pluripotent stem cell under conditions suitable for expansion of undifferentiated mammalian livestock pluripotent stem cells to thereby obtain a population of mammalian livestock pluripotent stem cells,

thereby deriving the mammalian livestock pluripotent stem cells line.

2. The method of claim 1, wherein said mammalian livestock pluripotent stem cells are capable of spontaneous differentiation into adipocytes in an absence of adipogenic differentiation agent(s).

3. The method of claim 2, wherein said mammalian livestock pluripotent stem cells are capable of spontaneous differentiation into adipocytes when cultured in a medium devoid of dexamethasone.

4. The method of any one of claims 1-3, wherein said isolating is effected when said embryo has developed a cyst characterized by a diameter of about 0.4 millimeter (mm) to about 1 mm.

5. The method of any one of claims 1-4, wherein said epiblast cell and/or said late-stage pluripotent stem cell are comprised in a disc-like structure in said embryo, and wherein said isolating further comprises removal of trophoectoderm cells or cells differentiated from said trophoectoderm cells surrounding said disc-like structure.

6. The method of any one of claims 1-5, further comprising removing a zona pellucida of said embryo prior to culturing said mammalian livestock embryo.

7. The method of any one of claim 1-6, wherein culturing said mammalian livestock embryo further comprising re-plating said mammalian livestock embryo on a fresh feeder cell layer or fresh extracellular matrix during said culturing period.

8. The method of claim 7, further comprising removing surrounding fibroblasts from said mammalian livestock embryo prior to said re-plating.

9. The method of any one of claims 1-8, wherein said epiblast cell and/or said late-stage pluripotent stem cell are characterized by a large nucleus to cytoplasm ratio.

10. The method of any one of claims 1-9, further comprising mechanically passaging said population of mammalian livestock pluripotent stem cells for at least 2 passages to thereby obtain a population enriched with said mammalian livestock pluripotent stem cells.

11. The method of any one of claims 1-9, further comprising mechanically passaging said population of mammalian livestock pluripotent stem cells for about 4-6 passages to thereby obtain a population enriched with said mammalian livestock pluripotent stem cells.

12. The method of claim 11, wherein said passaging said population enriched with said mammalian livestock pluripotent stem cells is performed every 5-10 days.

13. The method of claim 12, wherein said passaging said population enriched with said mammalian livestock pluripotent stem cells is performed by enzymatic passaging.

14. The method of claim 12, wherein said passaging said population enriched with said mammalian livestock pluripotent stem cells is performed by mechanical passaging.

15. The method of any one of claims 1-14, wherein said culturing said mammalian livestock embryo is performed on a two-dimensional culture system.

16. The method of any one of claims 1-14, wherein culturing said mammalian livestock embryo is performed on feeder cells.

17. The method of any one of claims 1-14, wherein said culturing said epiblast cell and/or said late-stage pluripotent stem cell is performed on a two-dimensional culture system.

18. The method of claim 15 or 17, wherein said two-dimensional culture system comprises a feeder-free matrix.

19. The method of claim 18, wherein said feeder-free matrix is selected from the group consisting of a Matrigel™ matrix, a fibronectin matrix, a laminin matrix, and a vitronectin matrix.

20. The method of any one of claims 1-19, wherein said isolating said epiblast cell and/or said late stage pluripotent stem cell is effected using syringe needle under stereoscope.

21. The method of any one of claims 1-20, wherein said culturing said mammalian livestock embryo is performed in a culture medium comprising a defined fetal mammalian livestock serum.

22. The method of claim 21, wherein said culture medium comprises a base medium selected from the group consisting of DMEM\F12, KO-DMEM and DMEM.

23. The method of any one of claims 1-20, wherein said culturing said mammalian livestock embryo is performed in a culture medium comprising the IL6RIL6 chimera.

24. The method of any one of claims 1-20, wherein said culturing said epiblast cell and/or said late stage pluripotent stem cell is performed in a culture medium comprising the IL6RIL6 chimera.

25. The method of claim 23 or 24, wherein said culture medium further comprises basic fibroblast growth factor (bFGF).

26. The method of claim 23 or 24, wherein said culture medium further comprises serum replacement.

27. The method of any one of claims 1-20, wherein said culturing said mammalian livestock embryo is performed in a culture medium comprising a Wnt3a polypeptide.

28. The method of any one of claims 1-20, wherein said culturing said epiblast cell and/or said late stage pluripotent stem cell is performed in a culture medium comprising a Wnt3a polypeptide.

29. The method of claim 27 or 28, wherein said culture medium further comprising basic fibroblast growth factor (bFGF) and leukemia inhibitory factor (LIF).

30. The method of claim 27 or 28, wherein said culture medium further comprising serum replacement.

31. The method of any one of claims 1-30, wherein said mammalian livestock embryo is obtained from *in vitro* fertilization of a mammalian livestock oocyte.

32. The method of any one of claims 1-30, wherein said mammalian livestock embryo is obtained by Nuclear Transfer (NT) of mammalian livestock cell.

33. The method of any one of claims 1-30, wherein said mammalian livestock embryo is obtained by parthenogenesis.

34. The method of claim 15, wherein said mammalian livestock embryo is placed on said two-dimensional culture system using a 27g needle or a pulled Pasteur Pipette.

35. The method of claim 16, wherein said mammalian livestock embryo is placed on said feeder cells using a 27g needle or a pulled Pasteur Pipette.

36. The method of any one of claims 1-33, wherein prior to said culturing said mammalian livestock embryo is covered with a drop of an extracellular matrix.

37. The method of any one of claims 1-36, wherein cells of said population of mammalian livestock pluripotent stem cells are capable of differentiation into the endoderm, mesoderm and ectoderm embryonic germ layers.

38. The method of any one of claims 1-37, wherein cells of said population of mammalian livestock pluripotent stem cells are capable of differentiation into embryoid bodies.

39. The method of any one of claims 1-38, wherein cells of said population of mammalian livestock pluripotent stem cells spontaneously differentiate into adipogenic cell lineage when cultured without passaging for about 14-21 days in a culture medium.

40. The method of claim 39, wherein said culture medium comprises serum.

41. The method of claim 39, wherein said culture medium comprises the IL6RIL6 chimera.

42. The method of any one of claims 1-41, wherein said mammalian livestock is a ruminant mammalian livestock.

43. The method of any one of claims 1-41, wherein said mammalian livestock is a non-ruminant mammalian livestock.

44. The method of claim 42, wherein said ruminant mammalian livestock is selected from the group consisting of a Bovinae subfamily, sheep, goat, deer, and camel.

45. The method of claim 44, wherein said ruminant mammalian livestock of said Bovinae subfamily is a cattle or a yak.

46. The method of claim 44, wherein said ruminant mammalian livestock of said Bovinae subfamily is a cattle.

47. The method of claim 45 or 46, wherein said cattle is buffalo, bison or cow (bovine).

48. The method of claim 45 or 46, wherein said cattle is cow (bovine).

49. The method of claim 43, wherein said non-ruminant mammalian livestock is selected from the group pig, rabbit, and horse.

50. The method of claim 43, wherein said non-ruminant mammalian livestock is a horse.

51. An isolated mammalian livestock pluripotent stem cell generated by the method of any one of claims 1-50, wherein said isolated mammalian livestock pluripotent stem cell is capable of differentiating into the ectoderm, mesoderm and ectoderm embryonic germ layers, and is capable of spontaneous differentiation into adipogenic cells when cultured in a medium devoid of dexamethasone.

52. A method of generating an adipocyte, comprising culturing the isolated mammalian livestock pluripotent stem cell of claim 51 or said population of mammalian livestock pluripotent stem cells obtained by the method of any one of claims 1-50 in a culture medium devoid of chemical or hormonal induction towards adipogenic lineage for at least 10 days and no more than 60 days without passaging, thereby generating the adipocyte.

53. The method of claim 52, wherein said culture medium is devoid of dexamethasone.

54. The method of claim 52 or 53, wherein said culture medium comprises serum.

55. The method of claim 52 or 53, wherein said culture medium comprises the IL6RIL6 chimera.

56. A method of preparing food product, comprising incorporating the adipocyte generated by the method of claim 52 with a food product, thereby preparing the food product.

57. A food product comprising the adipocyte generated by the method of claim 52.