CLAIMS

1. A non-human MYOD1 messenger RNA (mRNA), wherein the MYOD1 mRNA comprises the sequence set forth in SEQ ID NO: 1 or a nucleic acid sequence having 70% or more sequence identity to the nucleic acid sequence of SEQ ID NO:1.

2. The mRNA of claim 1, wherein the mRNA is porcine MYOD1 mRNA.

3. The mRNA of any one of claims 1 or 2, wherein the mRNA comprises a nucleic acid sequence having at least one nucleic acid modification as compared to the nucleic acid sequence of SEQ ID NO: 1, optionally wherein the mRNA comprises a nucleic acid sequence having 90% or more sequence identity to the nucleic acid sequence of SEQ ID NO: 1, optionally wherein the mRNA comprises at least one nucleic acid modification in the 5'UTR, 3'UTR and/or length of the polyA-tail.

4. A composition comprising the mRNA of any one of claims 1 to 3 and at least a second RNA molecule.

5. The composition of claim 4, further comprising an siRNA molecule, optionally wherein the siRNA molecule comprises POU5F1 (OCT3/4), SOX2, NANOG, SEEA-4, KLF4, and/or TRA-1-60.

6. The composition of claims 4 or 5, further comprising non-MYOD1 mRNA, optionally wherein the non-MYOD1 mRNA comprises MRF4, PAX7, PAX3, MYOG, MYF5 and/or MYF6 mRNA.

7. The composition of claim 4, further comprising siRNA and non-MYOD1 mRNA.

8. A plasmid comprising the mRNA of any one of claims 1 to 3.

9. The plasmid of claim 8, further comprising non-MYOD1 mRNA, optionally wherein the non-MYDO1 mRNA comprises MRF4, PAX7, PAX3, MYOG, MYF5 and/or MYF6 mRNA.

10. Use of the mRNA, composition or plasmid of any one of claims 1 to 9 in the production of an edible meat product.

11. A method for differentiating stem cells or transdifferentiating somatic cells, to produce an edible meat product, the method comprising:

(a) delivering nucleic acid molecules comprising two or more different ribonucleic acid (RNA) molecules into said cells, wherein the RNA molecules comprise non-human MYOD1 messenger RNA (mRNA) comprising the sequence set forth in SEQ ID NO: 1 or a nucleic acid sequence having 70% or more sequence identity to the nucleic acid sequence of SEQ ID NO: 1;

(b) modulating expression of one or more genes in said cells with aid of said nucleic acid molecules to cause at least a subset of said cells to yield one or more progenitor cells following delivery of said nucleic acid molecules, wherein upon said modulating, said nucleic acid molecules are not integrated into a genome of said cells;

(c) culturing said one or more progenitor cells to generate one or more cultured cells; and

(d) differentiating said one or more cultured cells to generate one or more terminally differentiated cells to produce said edible meat product.

12. The method of claim 11, wherein the MYOD1 mRNA is porcine MYOD1 mRNA, optionally wherein the MYOD1 mRNA comprises a nucleic acid sequence having at least one nucleic acid modification as compared to the nucleic acid sequence of SEQ ID NO: 1, optionally wherein the MYOD1 mRNA comprises a nucleic acid sequence having 90% or more sequence identity to the nucleic acid sequence of SEQ ID NO: 1, optionally wherein the MYOD1 mRNA comprises at least one nucleic acid modification in the 5'UTR, 3'UTR and/or polyA-tail.

13. The method of claims 11 or 12, wherein (d) comprises producing a tissue from said one or more terminally differentiated cells.

14. The method of claim 13, wherein said tissue comprises muscle tissue, and optionally fat tissue, neural tissue, vascular tissue, epithelial tissue, connective tissue, bone or a combination thereof.

15. The method of claim 13, wherein said one or more terminally differentiated cells comprise at least two types of terminally differentiated cells, optionally further comprising co-culturing said at least two types of terminally differentiated cells to generate a three-dimensional tissue, or wherein said at least two types of terminally differentiated cells comprise muscle cells, and optionally fat cells, somite cells, neural cells, endothelial cells, smooth muscle cells, bone cells, or a combination thereof.

16. The method of any one of claims 11 to 15, wherein said RNA molecules further comprise MYOG, MYF5, MYF6, PAX3, or PAX7, or any combination or variant thereof, optionally wherein at least one of said RNA molecules is chemically modified to improve its stability, optionally wherein chemical modifications to at least one of said RNA molecules comprise anti-reverse cap analogues, 3'-globin UTR, poly-A tail modifications, or any combination thereof.

17. The method of claim 11, wherein said RNA molecules further comprise non-MYOD1 messenger RNA (mRNA), microRNA (miRNA), transfer RNA (tRNA), silencing RNA (siRNA), self-amplifying RNA (saRNA) or a combination thereof.

18. The method of any one of claims 11 to 17, wherein said nucleic acid molecules further comprise complementary deoxyribonucleic acid (cDNA) molecules, optionally wherein said nucleic acid molecules are synthetic nucleic acid molecules, optionally wherein said nucleic acid molecules are delivered to said cells with neutral or anionic liposomes, cationic liposomes, lipid nanoparticles, ionizable lipids, or any combination or variation thereof.

19. The method of any one of claims 11 to 18, wherein steps (c) and (d) are performed in the same bioreactor chamber.

20. The method of any one of claims 11 to 18, wherein steps (c) and (d) are performed in different bioreactor chambers.