[6] If the world is to meet the ambition of reaching net zero carbon emissions by the middle of the century as outlined in the Paris Agreement on climate change, the food industry will have to play its part. All this and more clearly indicates that new ways to provide protein sources without needing to rear, slaughter and butcher livestock which not only reduce the impact of livestock farming on our environment but are also insulated from the effects of climate change are highly important.

4. SUMMARY OF THE INVENTION

[6a] In one aspect, provided herein is a method for improving myogenic differentiation capacity of a cell line, the method comprising: (a) providing a cell line; and (b) contacting the cell line with a culture media comprising: (i) at least a first Activin A inhibitor, (ii) at least a first BMP inhibitor, or (iii) at least a first WNT activator, or a combination thereof; thereby improving the cell line's myogenic differentiation capacity.

[6b] In one aspect, provided herein is a population of cells produced by any of the methods as described herein.

[6c] In one aspect, provided herein is a cell culture media for improving myogenic differentiation capacity of a cell line or an immortalized cell line, the cell culture media comprising: (a) at least a first Activin A inhibitor; (b) at least a first BMP inhibitor; (c) at least a first WNT activator, or a combination thereof.

[7] This disclosure features methods for improving myogenic differentiation capacity in a cell line or an immortalized cell line. Improving differentiation capacity of a cell line or an immortalized cell line is important because cell line adaptation into desired media (e.g., low cost media) and culture format (i.e., suspension culture) takes long periods (e.g., 1-3 months). This cell line adaptation is essential for enabling production of cell-based meat from cell lines, in particular, from immortalized cell lines. Once a cell line or an immortalized cell line is generated and deemed capable of being used at commercial scale to generate sufficient cells to make cell-based meat, this cell line or immortalized cell line is required to maintain its growth and function for long periods (e.g., 1- 6 months) in a bioreactor. As shown in **FIGs. 1A-1D**, culturing immortalized cell lines for the number of population doubling levels (e.g., about 100 PDLs) required for full cell line adaption results in loss of myogenic

differentiation capacity (e.g., decreased Pax7 expression, decreased MyHC1 expression, and decreased ability to form myotubes). The methods and compositions provided herein improve the myogenic differentiation capacity of a cell line or an immortalized cell line, thereby enabling the production of a cell-based meat product from cell lines and immortalized cells that may have otherwise lost their myogenic differentiation capacity during the requisite cell line adaptation steps.

[8] This disclosure is based in part on the discovery that culturing cell lines or immortalized cell lines in culture medium comprising at least a first Activin A inhibitor, at least a first BMP inhibitor, at least a first WNT activator, at least one epigenetic modulator, or a combination thereof, increases the myogenic differentiation capacity of the cell line or immortalized cell line. This disclosure is also based, in part, on the discovery that introducing into, or incorporating into the genome of, a cell of the cell line or immortalized cell line a polynucleotide encoding