[0006] Cultured meat products have the potential to: (1) substantially reduce reliance on slaughtered animals for food use, (2) lessen the environmental burden of raising animals for food supply, and (3) provide a reliable source of protein that is both safe and has consistent quality.

SUMMARY

[0007] The present disclosure provides methods for culturing avian fibroblast cells *in vitro*. The present disclosure also provides compositions for avian food products. This disclosure also sets forth processes for making and using products.

[0008a] In one aspect, the present disclosure refers to a method of producing an avian fibroblast cell food product *in-vitro,* the method comprising the steps of: a. culturing a population of avian fibroblast cells *in vitro* in a growth medium capable of maintaining the avian fibroblast cells; b. recovering the avian fibroblast cells; and c. formulating the recovered avian fibroblast cells into an edible food product.

[0008b] In another aspect, the present disclosure refers to a method of preparing for consumption, an avian product made from avian fibroblast cells grown *in vitro*, the method comprising: a. conditioning water with phosphates; b. hydrating a pulse protein isolate with the conditioned water to produce hydrated pulse protein; c. adding cell paste into the hydrated pulse protein to produce a cell and protein mixture; d. heating the cell and protein mixture in steps, wherein the steps comprise at least one of: i. ramping up the temperature of the cell and protein mixture to a temperature between 40-65 °C; ii. maintaining the temperature of the cell and protein mixture at least 15 minutes; iii. ramping up the temperature of the cell and protein mixture to a temperature between 60-85°C; e. cooling the cell and protein mixture to a temperature of between 5-15 °C; and f. adding an oil to the cell and protein mixture to create a pre-cooking product; and g. cooking the pre-cooking product to prepare the edible food product.

[0008c] In another aspect, the present disclosure refers to a food product produced by the method as disclosed herein.

[0008d] In another aspect, the present disclosure refers to a food product produced from avian fibroblasts, comprising: a. a cell paste, the cell paste content in an amount of at least 25% by weight, and wherein the cell paste is made from avian fibroblast cells grown in vitro; b. a mung bean protein, the mung bean protein content in an amount of at least 15 by weight; c. a fat, the fat content in an amount of at least 1% by weight; and d. a water, the water content in an amount of at least 20% by weight.

[0008] In some ~~embodiments~~examples, there are provided methods of producing a food product comprising avian fibroblast cells cultured *in vitro,* the methods comprising culturing a population of avian fibroblast cells *in vitro* in a growth medium capable of maintaining the avian fibroblast cells, recovering the avian fibroblast cells, and formulating the recovered avian fibroblast cells into an edible food product. In some ~~embodiments~~examples, the avian fibroblast cells comprise primary avian fibroblast cells. In some ~~embodiments~~examples, the avian fibroblast cells comprise secondary avian fibroblast cells.

[0009] In some ~~embodiments~~examples, there are provided methods of preparing a food product made from avian fibroblast cells grown *in vitro*, the method comprising the steps of: conditioning water with a phosphate to prepare conditioned water, hydrating a plant protein isolate or plant protein concentrate with the conditioned water to produce hydrated plant protein, contacting the cell paste with the hydrated plant protein to produce a cell and pulse protein mixture, heating the cell and plant protein mixture in steps, wherein the steps comprise at least one of:

ramping up the temperature of the cell and protein mixture to a temperature between 40-65 °C, maintaining the temperature of the cell and protein mixture at a temperature between 40-65 °C for 1 to 30 minutes, ramping up the temperature of the cell and protein mixture to a temperature between 60-85 °C, cooling the cell and protein mixture to a temperature between - 1-25 °C, and admixing the cell and protein mixture with a fat to create a pre-cooking product. The pre-cooking product can be consumed without further cooking. Alternatively, the pre-cooking product is cooked to produce the edible food product. Optionally, the pre-cooking product may be stored at room temperature, refrigeration temperatures or frozen.

[0010] In some ~~embodiments~~examples, there are provided food products produced from avian fibroblasts, comprising a cell paste, the cell paste content of at least 5% by weight, and

wherein the cell paste is made from avian fibroblast cells grown *in vitro*; a plant protein isolate or plant protein concentrate, the plant protein content at least 5% by weight; a fat, the fat content at least 5% by weight; and water, the water content at least 5% by weight.

[0011] In some ~~embodiments~~examples, the food composition or food product comprises about 1%-100% by weight wet cell paste.

[0012] In some ~~embodiments~~examples, plant protein isolates or plant protein concentrates are obtained from pulses selected from the group consisting of dry beans, lentils, mung beans, faba beans, dry peas, chickpeas, cowpeas, bambara beans, pigeon peas, lupins, vetches, adzuki, common beans, fenugreek, long beans, lima beans, runner beans, or tepary beans, soy beans, or mucuna beans. In various ~~embodiments~~examples, the pulse protein isolates or plant protein concentrates provided herein are derived from *Vigna angularis, Vicia faba, Cicer arietinum, Lens culinaris, Phaseolus vulgaris, Vigna unguiculata, Vigna subterranea, Cajanus cajan, Lupinus sp., Vetch sp., Trigonella foenum-graecum, Phaseolus lunatus, Phaseolus coccineus,* or *Phaseolus acutifolius*. In some ~~embodiments~~examples, the pulse protein isolates are derived from mung beans. In some ~~embodiments~~examples, the mung bean is *Vigna radiata*.

[0013] In some ~~embodiments~~examples, animal protein isolate and animal protein concentrate are obtained from animals or animal products. Examples of animal protein isolate or animal protein concentrate include whey, casein, and egg protein.

[0014] In some ~~embodiments~~examples, plant protein isolates are obtained from wheat, rice, teff, oat, corn, barley, sorghum, rye, millet, triticale, amaranth, buckwheat, quinoa, almond, cashew, pecan, peanut, walnut, macadamia, hazelnut, pistachio, brazil, chestnut, kola nut, sunflower seeds, pumpkin seeds, flax seeds, cacao, pine nut, ginkgo, and other nuts.

BRIEF DESCRIPTIONS OF THE DRAWINGS

[0015] Fig. 1 depicts a process diagram for culturing of avian fibroblast cells.

[0016] Fig. 2 depicts a process diagram for harvesting cultured avian fibroblast cells.

[0017] Fig. 3 depicts a hierarchical clustering of the transcriptome analysis of three biological replicates of chicken cell pools (JUST1, JUST2, JUST3) used to manufacture a cultured chicken meat product (JUST7, JUST8, JUST9).

[0018] Fig. 4A depicts chicken fibroblast cell adaptation in low serum media indicating cell viability as a function of culture time. Fig. 4B depicts chicken fibroblast cell adaptation in low serum media indicating population doubling time as a function of passage number.