CAS STNext® COFFEE LECTURE

Searching Processes and technologies for cell-based meat on CAS STNext

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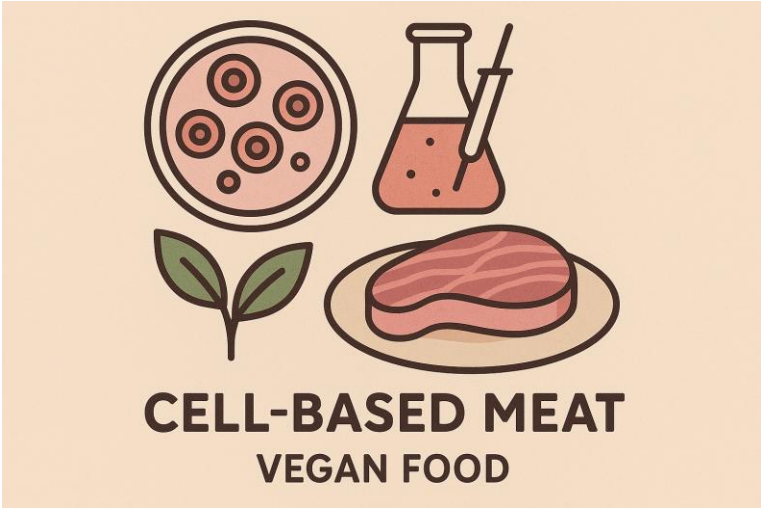
Summary

Cell-based meat production

- Producing plant-based proteins
- Adding further texture with fiber and fat
- Various production processes
- Plant-based fish products
- IPC/CPC or text-based search strategies
- Other files on CAS STNext



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Examples of a key patent for vegan meat

Older process IP that is still frequently cited in search reports

TI Meat substitute prepd by extrusion cooking of vegetable protein
PA (WEGE-C) WENGER MFG INC; (WENG-N) WENGER MFG INC
PI US 3970761 A 19760720 (197631) * EN
BR 7507978 A 19761206 (197652) PT
DE 2623601 A 19761215 (197652) DE
SE 7602292 A 19761219 (197702) SV
JP 51144754 A 19761212 (197705) JA
JP 51144755 A 19761212 (197705) JA
ZA 7601110 A 19770105 (197713) EN
GB 1515879 A 19780628 (197826) EN
US 4099455 A 19780711 (197837) EN
CA 1075961 A 19800422 (198019) EN
CH 624279 A 19810731 (198134) DE
DE 2623601 C 19821021 (198243) DE
AB US 3970761 A UPAB 20050415
NOVELTY - Meat substitute prodt. is made from vegetable protein by extrusion cooking. The protein mixed with sufficient moisture e.g., hot water or steam, is worked in an agitator into a hot flowable unoriented mixt. The mixt. is then passed through helical screw extruder arrangement to knead it both radially and axially. This is followed by unrestricted flow through an elongated passageway designed to stretch and orient the mixt. axially so that it becomes layered. In this condition the mixt. is extruded through a die plate to form a dense layered prodt. Temp. and press. are controlled in the extrusion stages. Used to mfr. chunks which can be used in soups, curries, stews, pot pies, casseroles, dry soup mixes, oriental dishes, canned foods; or as fried, broiled or breaded bite-sized pieces.
IPCR A23J0003-00 [I,A]; A23J0003-14 [I,A]; A23J0003-22 [I,A]; A23J0003-26 [I,A]
CPC A23J0003-227; A23J0003-26; Y10S0426-802

Recent patent on in-vitro cell growth

TI Plant-based or fungal-based cellulose scaffold particles used for e.g. proliferating cells in-vitro, cellular in-vitro meat cell-production, cultured meat cell-production, agriculture, and tissue engineering proliferation of cell-banks

PA (SPID-N) SPIDERWORT BIOTECHNOLOGIES INC

PI **WO 2025059779** A1 20250327 (2025038)* EN 119[41]

AB WO 2025059779 A1 UPAB 20250509

NOVELTY - Plant-based or fungal-based cellulose scaffold particles for proliferating cells in-vitro.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for proliferating cells in-vitro, comprising (a) adding a batch of culture medium comprising cells in a container filled with plant-based or fungal-based cellulose scaffold particles, and (b) allowing the cells to grow on the surface of the scaffold particles for at least 1 day.

USE - The scaffold particles are useful: for proliferating animal cells, plant cells, or human cells in-vitro; for cellular in-vitro meat cell-production, cultured meat cell-production, agriculture, tissue engineering, 3D tissue culturing, proliferation of cell-banks, stem cells, in-vitro drug testing, protein harvesting, virus and vaccine production, biomolecule amplification, plasmid amplification, production of metabolites, production of cosmetic actives, production of biopharmaceuticals, production of recombinant proteins, biological filtration, waste-water treatment, industrial cleaning operations, or food production; and as edible scaffolds for the production of dairy products (all claimed).

ADVANTAGE - The particles: are biocompatible and biodegradable; facilitates cell growth in suspension and contribute to the textural properties, cellular organization or cellular differentiation in a final product; increases in-vitro proliferation by increasing the number of scaffold particles in the container, or changing, altering or selecting the size of the scaffold particles in the container.

Earlier invention to replicate meat tissue

TI Meat substitute composition for making muscle tissue replica, fat tissue replica, and connective tissue replica, comprises a protein content comprising one or more isolated and purified proteins

PA (IMPF-C) IMPOSSIBLE FOODS INC; (MARA-N) MARAXI INC; (SAND-N) SAND HILL FOODS INC; (BROW-I) BROWN P O; (BROW-I) BROWN P; (EISE-I) EISEN M; (SOLO-I) SOLOMATIN S; (VARA-I) VARADAN R; (VRLJ-I) VRLJIC M

PI **WO 2013010042** A1 20130117 (201309) * EN

AB WO 2013010042 A1 UPAB 20200731

NOVELTY - A meat substitute composition comprises a protein content, where one or more isolated and purified proteins account for 10% or more of the protein content by weight, where the meat substitute composition accurately mimics the taste, texture, or color of a meat product derived from animal sources.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are:

(1) a meat substitute product that comprises an indicator that indicates cooking progression from a raw state to a cooked state, where the meat substitute product is derived from non-animal sources;

(2) a muscle tissue replica comprising a protein content, where the protein content comprises one or more isolated and purified proteins, where the muscle tissue replica approximates the taste, texture, or color of an equivalent muscle tissue derived from an animal source;

(3) a fat tissue replica comprising a gelled emulsion, the gelled emulsion comprising a protein solution with fat droplets suspended to it;

(4) a connective tissue replica, comprising a protein content comprising one or more isolated, purified proteins, where the protein content has been assembled into structures approximating the texture and visual appearance of connective tissue or skin;

Options for vegan fish products

TI Vegan fish substitute, comprises water-saturated legume protein flakes, edible fibers, and vegetable oil

PA (GANS-N) GAN SHMUEL HEALTH IND 2017 AGRIC COOP SL; (GANS-N) GAN SHMUEL HEALTH IND 2017 AGRIC COOP; (VGAR-N) VGARDEN LTD

PI WO 2024057321 A1 20240321 (2024027)* EN 12[1]
IL 296553 B 20230901 (2024081) EN
AU 2023340749 A1 20250327 (2025028) EN

AB WO 2024057321 A1 UPAB 20240404

NOVELTY - Vegan fish substitute comprises 50-70 wt.% water-saturated legume protein flakes, 3-5 wt.% edible fibers, and 25-35 wt.% vegetable oil, where all the water is contained in the saturated legume protein flakes, and the water-saturated legume protein comprises dry legume protein flakes and water in a ratio of 0.2-0.55 (wt.% dry legume protein flakes)/(wt.% water).

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for method for preparing the vegan fish substitute.

USE - As vegan fish substitute.

ADVANTAGE - The vegan fish substitute mimics the texture and flavor of natural fish such as tuna.

IPCI A23L0011-00 [I,A]; A23L0011-00 [I,A]; A23L0011-00 [I,C]; A23L0017-00 [I,A]; A23L0017-00 [I,A]; A23L0017-00 [I,C]

CPC A23J0003-14; A23L0011-00; A23L0011-01; A23L0011-03

The IPC has some options for protein food

The CPC doesn't have more specific symbols to these

A23J 3/00	**Working-up of proteins for foodstuffs [2006.01]**
	Note(s) **[5]** In groups A23J 3/04-A23J 3/20, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary,
A23J 3/04	• Animal proteins **[2006.01]**
A23J 3/06	• • Gelatine **[2006.01]**
A23J 3/08	• • Dairy proteins **[2006.01]**
A23J 3/10	• • • Casein (drying casein A23J 1/22) **[2006.01]**
A23J 3/12	• • from blood **[2006.01]**
A23J 3/14	• Vegetable proteins **[2006.01]**
A23J 3/16	• • from soybean **[2006.01]**
A23J 3/18	• • from wheat **[2006.01]**
A23J 3/20	• Proteins from microorganisms or unicellular algae **[2006.01]**
	Note(s) **[5]** Subject matter classified in groups A23J 3/22-A23J 3/30 is also classified in groups A23J 3/04-A23J 3/20, if the nature of the protein is of interest.
A23J 3/22	• by texturising **[2006.01]**
A23J 3/24	• • using freezing **[2006.01]**
A23J 3/26	• • using extrusion or expansion **[2006.01]**
A23J 3/28	• • using coagulation from or in a bath, e.g. spun fibres **[2006.01]**
A23J 3/30	• by hydrolysis **[2006.01]**
A23J 3/32	• • using chemical agents **[2006.01]**
A23J 3/34	• • • using enzymes **[2006.01]**

Postings for the IPC terms in WPIndex

```
=> e a23j0003-00+nt/ipc

E1        3856   -->   A23J0003-00/IPC
E2        1964   NT1   A23J0003-04/IPC
E3         376   NT2   A23J0003-06/IPC
E4        1551   NT2   A23J0003-08/IPC
E5         758   NT3   A23J0003-10/IPC
E6         237   NT2   A23J0003-12/IPC
E7        4006   NT1   A23J0003-14/IPC
                       . Vegetable proteins
E8        4075   NT2   A23J0003-16/IPC
                       . . from soybean
E9        1266   NT2   A23J0003-18/IPC
                       . . from wheat
E10        766   NT1   A23J0003-20/IPC
                       . Proteins from microorganisms algae
E11       2240   NT1   A23J0003-22/IPC
                       . by texturising
E12        176   NT2   A23J0003-24/IPC
                       . . using freezing
E13       1549   NT2   A23J0003-26/IPC
                       . . using extrusion or expansion
E14        259   NT2   A23J0003-28/IPC
                       . . using coagulation from or in a bath,
E15        613   NT1   A23J0003-30/IPC
                       . by hydrolysis
E16        391   NT2   A23J0003-32/IPC
                       . . using chemical agents
E17       4246   NT3   A23J0003-34/IPC
                       . . . using enzymes
```

```
=> s e7+nt

L1        7811 A23J0003-14+NT/IPC  (3 TERMS)
```


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Relevant controlled terms in CAplus

Review the CA Lexicon for relationships

```
E70       2520     NT1  Meat substitutes/CT
E71          2       NT2  Canned meat substitutes/CT
E72        305       NT2  In vitro meat/CT
E73         47       NT2  Meat extenders/CT
E74         14       NT2  Meat fillers/CT
E75        732       NT2  Plant-based meat substitutes/CT
E76        123       NT2  Sausage substitutes/CT
```

```
E138     20957        Plant proteins/CT
E169        75     NT1  Chickpea proteins/CT
E188      1999     NT1  Corn proteins/CT
E259       554     NT1  Oat plant proteins/CT
E358      3103     NT1  Pea proteins/CT
E402       461     NT1  Plant seed proteins/CT
E403       664     NT1  Plant-derived food proteins/CT
E409      1274     NT1  Rice proteins/CT
E455     36153     NT1  Soybean proteins/CT
E458       209     NT1  Sunflower seed proteins/CT
E499      1585     NT1  Wheat proteins/CT
```

```
=> s e70+nt

L1          3514 "MEAT SUBSTITUTES"+NT/CT  (7 TERMS)
```

```
L3         61942 ("PLANT PROTEINS"/CT OR "CHICKPEA PROTEINS"/CT OR "CORN PROTEINS
                 "/CT OR "OAT PLANT PROTEINS"/CT OR "PEA PROTEINS"/CT OR "PLANT
                 SEED PROTEINS"/CT OR "PLANT-DERIVED FOOD PROTEINS"/CT OR "RICE
                 PROTEINS"/CT OR "SOYBEAN PROTEINS"/CT OR "SUNFLOWER SEED PROTEIN
                 S"/CT OR "WHEAT PROTEINS"/CT)
```

```
=> s l1 and l3

L4          1317 L1 AND L3
```


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A review shows chemical modifications

AN 2025:1167299 CAPLUS Full-text
DN 191:355146
TI Role of chemically-modified proteins for the formulation of plant-based animal-product alternatives
AU Keerthi, R.; Praveena, Ug.; Pillai, Prasanth K. S.; Ragavan, K. V.; Anandharamakrishnan, C.
CS Agro-Processing and Technology Division, CSIR- National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram, 695019, India
SO **Food Hydrocolloids** (2025), 168, 111545

AB A review. The burgeoning plant-based animal product alternatives (PBAA) sector is an emerging vertical of food products aimed at replicating meat and dairy products while mitigating their drawbacks. Conventionally, soy protein is a common base used to formulate the above category of products. However, its limitations in

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opportunities. This review emphasizes and deliberates different chem. modification techniques, such as deamidation, acylation, glycation, phosphorylation, pH shifting, and cationization, for plant proteins and their application in the development of PBAA, thereby creating new opportunities in the plant-based food market.

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Combining deamination with plant-based proteins

```
   L14         104 S DEAMIDATION AND L3

L14  ANSWER 1 OF 104  CAPLUS  COPYRIGHT 2025 ACS on STN
TI   Protein Deamidation Reduced Digestive Resistance and Amyloid Antigenicity of Soy
     Proteins via Depolymerization

L14  ANSWER 2 OF 104  CAPLUS  COPYRIGHT 2025 ACS on STN
TI   Enzyme agent for protein deamidation and protein crosslinking and use thereof

L14  ANSWER 3 OF 104  CAPLUS  COPYRIGHT 2025 ACS on STN
TI   A modification method for improving the solubility of soybean protein

L14  ANSWER 4 OF 104  CAPLUS  COPYRIGHT 2025 ACS on STN
TI   Modified leguminous protein with improved colloidal stability

L14  ANSWER 5 OF 104  CAPLUS  COPYRIGHT 2025 ACS on STN
TI   Research progress on the effect of deamidation modification on the functional
     properties of plant proteins
```


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Further sources for plant-based meat

Using the STN-Index function

```
=> index food wpindex

INDEX 'AGRICOLA, BIOSIS, BIOTECHNO, CABA, CAPLUS, FSTA, NTIS, SCISEARCH,
       TOXCENTER, WPINDEX' ENTERED AT 11:48:35 ON 04 OCT 2025

10 FILES IN THE FILE LIST IN STNINDEX

Enter SET DETAIL ON to see search term postings or to view
search error messages that display as 0* with SET DETAIL OFF.

=> s (plant-based or plant protein) and meat(a)(analogue or substitute or alternative or vegan)

         727   FILE AGRICOLA
         625   FILE BIOSIS
        1324   FILE CABA
        2075   FILE CAPLUS
        2403   FILE FSTA
        1278   FILE SCISEARCH
         197   FILE TOXCENTER
         476   FILE WPINDEX

   8 FILES HAVE ONE OR MORE ANSWERS,    10 FILES SEARCHED IN STNINDEX
```

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Databases have their own terminology

Controlled terms from FSTA (left) and CABA (right)

TERM #	# OCC	# DOC	% DOC	CT
1	1919	1919	79.86	PLANT FOODS
2	1832	1832	76.24	PLANT PRODUCTS
3	1687	1687	70.20	PLANT-BASED MEAT
4	1687	1687	70.20	VEGAN MEAT
5	1574	1574	65.50	SIMULATED FOODS
6	1313	1313	54.64	PROCESSED FOODS
7	1274	1274	53.02	FOODS
8	1262	1262	52.52	FOOD PRODUCTS
9	1262	1262	52.52	FOODSTUFFS
10	1252	1252	52.10	PREPARED FOODS
11	1171	1171	48.73	ALTERNATIVES
12	905	905	37.66	MEAT SUBSTITUTES
13	883	883	36.75	SENSORY PROPERTIES
14	832	832	34.62	ORGANOLEPTIC PROPERTIES
15	799	799	33.25	NUTRIENTS

TERM #	# OCC	# DOC	% DOC	CT
1	896	896	67.67	MEAT ANALOGUES
2	470	470	35.50	MEAT
3	400	400	30.21	TEXTURE
4	302	302	22.81	PLANT PRODUCTS
5	300	300	22.66	MEAT PRODUCTS
6	278	278	21.00	PLANT PROTEIN
7	262	262	19.79	PROTEINS
8	251	251	18.96	REVIEWS
9	240	240	18.13	SENSORY EVALUATION
10	238	238	17.98	CONSUMERS
11	211	211	15.94	NUTRITIVE VALUE
12	209	209	15.79	PHYSICOCHEMICAL PROPERTIES
13	206	206	15.56	SOYA PROTEIN
14	193	193	14.58	PROTEIN CONTENT
15	172	172	12.99	CHEMICAL COMPOSITION

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WPIndex has manual codes

Not very specific for this topic

TERM #	# OCC	# DOC	% DOC	MC	
1	263	263	55.25	D03-F06	(Protein composition)
2	223	223	46.85	D03-N	(Vegetable products)
3	178	178	37.39	A12-W09	(Polymer-food applications)
4	86	86	18.07	D05-A04D	(Fermented foods)
5	83	83	17.44	D02-A03B	(Minced/chopped meat)
6	82	82	17.23	D03-P	(Fruit products)
7	62	62	13.03	A03-A00A	(Polysaccharides)
8	55	55	11.55	D03-F02	(Protein recovery from soya)
9	47	47	9.87	D03-H01H	(Fluid foods)
10	46	46	9.66	D03-H01G	(Fruit juices)

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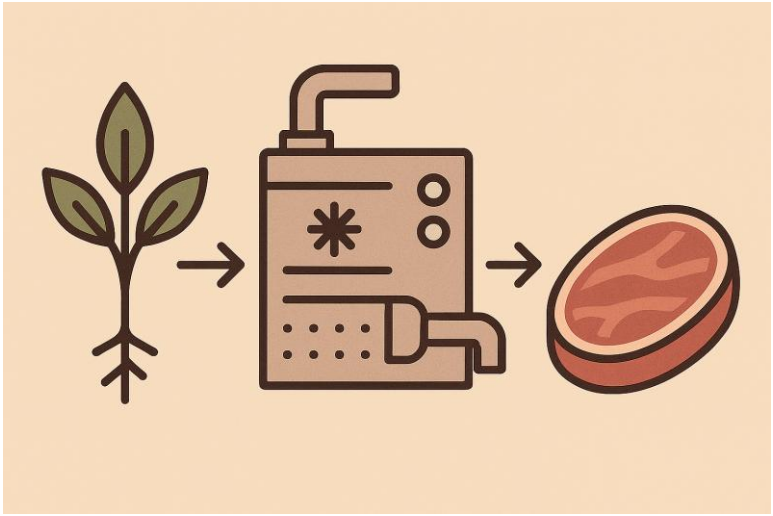

Between problems and progress are connections that matter

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