REGULATING MEAT WITHOUT SLAUGHTER:

DEFINITIONAL SOVEREIGNTY AND THE GLOBAL FRAGMENTATION OF CELL-CULTIVATED MEAT REGULATION

Yi Lu[*]

ABSTRACT

Cell-cultivated meat, real animal protein grown from cells in a bioreactor rather than raised and slaughtered, has been federally approved for commercial sale in the United States since 2023, yet criminalized in eight American states. This article provides a comparative legal analysis of the regulatory frameworks governing this product in the three largest food markets: the United States, the European Union, and China. The prohibitions, driven by rural agricultural interests, fall most directly on urban consumers denied access to a federally approved food product.

In the United States, the FDA and USDA improvised a shared jurisdictional pathway from existing food safety statutes, producing what this article terms a "dual fragmentation": while the federal framework treats cultivated chicken and conventional chicken as the same regulatory category, eight states have enacted outright prohibitions, most carrying criminal penalties. The resulting constitutional collision over federal preemption and the dormant Commerce Clause may redefine the boundaries of food federalism for a generation. The European Union requires pre-market authorization through its Novel Food Regulation, a pathway that is scientifically rigorous but so procedurally demanding that no cultivated meat product has yet been approved. Yet Italy has enacted an outright

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[*]Assistant Professor, Boğaziçi University Faculty of Law; Fellow, Max Planck Institute for Comparative Public Law and International Law. ORCID: 0009-0007-8025-2732. The author thanks Professor Francis Snyder (C.V. Starr Professor of Law Emeritus, Peking University School of Transnational Law) and Professor Anne Peters (Director, Max Planck Institute for Comparative Public Law and International Law) for their generous guidance and support. The author also thanks the editors of the *Fordham Urban Law Journal* for their careful editorial work.

national ban that reflects an assertion of cultural sovereignty over the food system and will test the limits of European Union single market principles once authorization is granted. China is building the full regulatory infrastructure, including safety assessment guidelines, technical standards, and a dedicated regulatory vocabulary, before granting any commercial approval through its "new-food raw-material" pathway, effectively controlling the terms on which cultivated meat will enter the world's largest food market.

Three cross-cutting dimensions structure this divergence: the innovation-safety equilibrium, "definitional sovereignty" over the legal meaning of "meat," and the political economy of incumbent resistance. At stake is a question that goes beyond food safety: whether the legal definition of "meat" is a functional category to be updated as production technology evolves, or a cultural boundary that the law must defend against technological change. The article tests each regulatory framework against the WTO's SPS Agreement and finds that the United States, long the most vocal proponent of science-based trade standards, has produced the regime least defensible under the disciplines it championed.

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INTRODUCTION: WHEN THE LAW MEETS THE BIOREACTOR

On the evening of July 1, 2023, a restaurant called Bar Crenn in San Francisco served a plate of chicken to a paying customer.[1] The chicken had never been alive. It had never been hatched, raised, fed, transported, or slaughtered. It had been grown from animal cells in a stainless-steel bioreactor, a process on which the producing company, UPSIDE Foods, had spent eight years and more than six hundred million dollars.[2] The meal was the culmination of an elaborate regulatory process: UPSIDE Foods had completed a pre-market safety consultation with the United States Food and Drug Administration (FDA) in November 2022,[3] received a grant of inspection and label approval from the United States Department of Agriculture's Food Safety and Inspection Service (FSIS) in June 2023,[4] and was now legally authorized to sell its cell-cultivated[5] chicken to American

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1. *See UPSIDE Foods Makes History with First Consumer Sale of Cultivated Meat in the US and Highly Anticipated Restaurant Debut*, PR NEWSWIRE (July 1, 2023), https://www.prnewswire.com/news-releases/upside-foods-makes-history-with-first-consumer-sale-of-cultivated-meat-in-the-us-and-highly-anticipated-restaurant-debut-301868494.html [https://perma.cc/2MRA-Z8RT].

2. *See UPSIDE Is Approved for Sale in the US! Here's What You Need to Know*, UPSIDE FOODS (June 21, 2023), https://upsidefoods.com/blog/upside-is-approved-for-sale-in-the-us-heres-what-you-need-to-know [https://perma.cc/3EK2-UM32]; *UPSIDE Foods Raises a $400M Series C Round to Commercialize Cultivated Meat at Scale*, PR NEWSWIRE (Apr. 21, 2022), https://www.prnewswire.com/news-releases/upside-foods-raises-a-400m-series-c-round-to-commercialize-cultivated-meat-at-scale-301529998.html [https://perma.cc/KX7K-LR2V].

3. *See FDA Completes First Pre-Market Consultation for Human Food Made Using Animal Cell Culture Technology*, U.S. FOOD & DRUG ADMIN. (Nov. 16, 2022) [hereinafter *First Consultation*, FDA], https://www.fda.gov/food/cfsan-constituent-updates/fda-completes-first-pre-market-consultation-human-food-made-using-animal-cell-culture-technology [https://perma.cc/9S25-UMMR]; Letter from Kristi Muldoon-Jacobs, Acting Dir., Off. of Food Additive Safety, U.S. Food & Drug Admin., to Nicole Berzins, Dir., Regul. Affs., UPSIDE Foods, Inc. (Nov. 16, 2022), https://www.fda.gov/media/163260/download [https://perma.cc/6QCM-WMT6].

4. *See History Made: UPSIDE Foods Is Approved to Sell Cultivated Meat in the U.S. Following Completion of Final USDA Regulatory Step*, PR NEWSWIRE (June 21, 2023), https://www.prnewswire.com/news-releases/history-made-upside-foods-is-approved-to-sell-cultivated-meat-in-the-us-following-completion-of-final-usda-regulatory-step-301857015.html [https://perma.cc/UC9H-TNNA].

5. A note on terminology is warranted. The food product at the center of this article has been called, at various times and by various stakeholders, "lab-grown meat," "cell-cultured meat," "cultivated meat," "cell-based meat," and "clean meat." Each term carries connotations

consumers. It was the first time in the history of the United States that meat produced without slaughter had been commercially sold.[6]

Two years later, however, the same product had become a criminal offense in eight American states.[7] Florida, Alabama, Mississippi, Nebraska, Montana, Indiana, Texas, and South Dakota had each enacted legislation prohibiting the manufacture, sale, or distribution of cell-cultivated meat within their borders.[8] Violations are generally charged as misdemeanors, accompanied in some states by administrative sanctions such as disciplinary action, license suspension, and stop-sale orders.[9] The Governor of Florida, when signing his state's ban, described it as "fighting back against the global elite's plan to force the world to eat meat grown in a petri dish or bugs to achieve their authoritarian goals."[10] The Texas Agriculture Commissioner, for his part, declared that "Texans have a God-given right to know what's on their plate, and for millions of Texans, it better come from a pasture, not a lab."[11] Thus, a product that had been reviewed and authorized for sale by

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that reflect the speaker's perspective. "Lab-grown" emphasizes the artificial production environment and is disfavored by the industry. "Cultivated" is the industry's preferred term, drawing an implicit analogy to agriculture. "Cell-based" is descriptively accurate but clinically neutral. "Clean meat" implies a moral superiority over conventional meat that proponents embrace and opponents reject. This article uses "cell-cultivated meat" as its primary term, a descriptor that is both technically accurate and normatively neutral, identifying the production method without endorsing or denigrating the product. Where the discussion concerns a specific jurisdiction's regulatory terminology, the jurisdiction's own usage is employed.

6. *See* Grace Galler, *UPSIDE Foods Makes History with First Consumer Sale*, NEW FOOD (July 5, 2023), https://www.newfoodmagazine.com/upside-foods-makes-history-with-first-consumer-sale/783572.article [https://perma.cc/48MX-PGJW].

7. The eight states that have enacted outright bans on cell-cultivated meat are Florida, Alabama, Mississippi, Nebraska, Montana, Indiana, Texas, and South Dakota. *See* Emily Whitest, *Alternative Proteins: 2025 Legislative Update*, NAT'L AGRIC. L. CTR. (Oct. 2, 2025) [hereinafter *Legislative Update*, NALC], https://nationalaglawcenter.org/alternative-proteins-2025-legislative-update/ [https://perma.cc/JG9D-S554; Cecelia Smith-Schoenwalder, *States Try to Snuff Out Lab-Grown Meat Before It Really Starts*, U.S. NEWS & WORLD REP. (Dec. 23, 2025), https://www.usnews.com/news/best-states/articles/2025-12-23/states-try-to-snuff-out-lab-grown-meat-before-it-really-starts [https://perma.cc/85PY-A3HN].

8. *See* FLA. STAT. § 500.452 (2024); ALA. CODE § 20-1-161 (2025); MISS. CODE ANN. § 75-35-15 (2025); NEB. REV. STAT. § 81-2282(2)(e) (2025); MONT. CODE ANN. §§ 50-31-501(6), 50-31-511 (2025); IND. CODE § 15-17-5-6.1 (2025); TEX. HEALTH & SAFETY CODE ANN. § 433.057 (West 2025); S.B. 124, 2026 Leg., Reg. Sess. (S.D. 2026).

9. *See, e.g.*, FLA. STAT. § 500.452 (2024).

10. Press Release, Exec. Off. of the Governor of Fla., Governor DeSantis Signs Legislation to Keep Lab-Grown Meat Out of Florida (May 1, 2024) [hereinafter DeSantis Press Release], https://www.flgov.com/eog/news/press/2024/governor-desantis-signs-legislation-keep-lab-grown-meat-out-florida [https://perma.cc/EU49-W3GH].

11. *Commissioner Miller Praises Texas Legislature for Putting a Fork in Lab-Grown Meat*, TEX. DEP'T OF AGRIC. (June 26, 2025), https://texasagriculture.gov/News-Events/Article/10442/COMMISSIONER-MILLER-PRAISES-TEXAS-LEGISLATURE-FOR-PUTTING-A-FORK-IN-LAB-GROWN-M [https://perma.cc/FU43-Q8LE].

two federal agencies, under the same legal framework that governs conventional poultry, was now treated as contraband in a substantial portion of the country.

The burden of these prohibitions falls disproportionately on urban consumers. Cultivated meat was developed in and for metropolitan markets, and the first commercial sales took place in San Francisco and Washington, D.C.[12] The state bans, driven by rural agricultural interests, deny urban populations access to a product that the federal government has determined to be safe. That denial matters, because urban populations already bear a disproportionate share of food insecurity. An estimated 1.7 billion of the world's 2.2 billion food-insecure people live in urban and peri-urban areas, where residents depend on the market for food rather than on their own production.[13] It is precisely here that cell-cultivated meat carries an urban promise. Produced in facilities rather than on distant farmland, it has been advanced as a scalable source of affordable protein for the food deserts that rising meat prices have hit hardest.[14] A ban meant to protect rural producers thus forecloses, for urban consumers, one of the few protein pathways designed to reach them.

This extraordinary disjunction, federal approval and state criminalization of the same food product, is not merely an American curiosity. It is, rather, a microcosm of a far broader global regulatory divergence that is unfolding in real time. The United States, the European Union, and China, the three largest food markets in the world, are each developing distinctly different regulatory responses to cell-cultivated meat, and those responses reflect different conceptions of the state's role in governing technological disruption in the food system as much as different technical judgments about food safety.[15]

The United States exhibits what this article terms a "dual fragmentation." At the federal level, the FDA and USDA have adopted a pragmatic, innovation-permissive posture, applying existing statutory authority to a

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12. LISA S. BENSON & ELENI G. BICKELL, CONG. RSCH. SERV., R47697, CELL-CULTIVATED MEAT: AN OVERVIEW 8–9 (2023) [hereinafter CRS REPORT], https://www.congress.gov/crs-product/R47697 (on file with the *Fordham Urban Law Journal*).

13. HIGH LEVEL PANEL OF EXPERTS ON FOOD SEC. & NUTRITION, COMM. ON WORLD FOOD SEC., HLPE REP. NO. 19: *STRENGTHENING URBAN AND PERI-URBAN FOOD SYSTEMS TO ACHIEVE FOOD SECURITY AND NUTRITION, IN THE CONTEXT OF URBANIZATION AND RURAL TRANSFORMATION* 2, 67 (2024), https://openknowledge.fao.org/handle/20.500.14283/cd1459en [https://perma.cc/U2U6-AVJ9].

14. *See* Sheryl Zhang, *Can Chicago's Bio-Labs Solve a Growing Meat Divide?*, CHI. REP. (June 11, 2026), https://www.chicagoreporter.com/can-chicagos-bio-labs-solve-a-growing-meat-divide/ [https://perma.cc/9GRV-6WN4].

15. *See infra* Part IV.A (analyzing the United States, European Union, and Chinese regulatory frameworks in turn).

novel product without enacting new legislation.[16] At the state level, a powerful counter-movement driven by agricultural interests and cultural politics[17] has produced outright prohibitions[18] that cut against the federal regulatory framework.[19] The result is a constitutional collision, involving the Commerce Clause, the Supremacy Clause, and the federal preemption doctrine, that the federal courts are only beginning to adjudicate.[20]

The European Union, by contrast, has channeled cell-cultivated meat into its existing Novel Food Regulation, which requires comprehensive pre-market scientific risk assessment by the European Food Safety Authority (EFSA) before any novel food product may be sold within the Union.[21] As of early 2026, the first applications for cultivated meat authorization have

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16. *See* FORMAL AGREEMENT BETWEEN THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES FOOD AND DRUG ADMINISTRATION AND U.S. DEPARTMENT OF AGRICULTURE OFFICE OF FOOD SAFETY (Mar. 7, 2019) [hereinafter FDA-USDA FORMAL AGREEMENT], https://www.fsis.usda.gov/sites/default/files/media_file/2020-07/Formal-Agreement-FSIS-FDA.pdf [https://perma.cc/4EGY-E6ST]; *see also* U.S. GOV'T ACCOUNTABILITY OFF., GAO-20-325, FOOD SAFETY: FDA AND USDA COULD STRENGTHEN EXISTING EFFORTS TO PREPARE FOR OVERSIGHT OF CELL-CULTURED MEAT 2–3 (Apr. 7, 2020), https://www.gao.gov/assets/gao-20-325.pdf [https://perma.cc/T3VS-X8G4].

17. *See* S. RSCH. CTR., *BILL ANALYSIS*, TEX. C.S.S.B. 261, 89th Leg., R.S. (Mar. 28, 2025) [hereinafter TEX. S.B. 261 BILL ANALYSIS], https://capitol.texas.gov/tlodocs/89R/analysis/pdf/SB00261S.pdf [https://perma.cc/N4C9-QH2E] (stating that cell-cultured products could disrupt traditional livestock markets and that the measure would support traditional agriculture); Press Release, Tex. & Sw. Cattle Raisers Ass'n, *TSCRA Applauds Bipartisan Passage of SB 261 That Prohibits the Sale of Cell-Cultured Proteins in the State* (May 26, 2025), https://tscra.org/tscra-applauds-bipartisan-passage-of-sb-261-that-prohibits-the-sale-of-cell-cultured-proteins-in-the-state/ [https://perma.cc/P8BP-2GDU]; DeSantis Press Release, *supra* note 10 (quoting the Governor and the Commissioner of Agriculture framing the ban as a defense of agricultural interests against what the Governor called the "global elite's plan"); Erin Bamer, *Gov. Jim Pillen Celebrates Nebraska Ban on Lab-Grown Meat at O'Neill Butcher Shop*, NEB. EXAMINER (July 17, 2025), https://nebraskaexaminer.com/2025/07/17/gov-jim-pillen-celebrates-nebraska-ban-on-lab-grown-meat-at-oneill-butcher-shop/ [https://perma.cc/N3F3-EW4R] (reporting the Nebraska governor, a hog farmer, presenting the prohibition as a defense of the state's agricultural industry).

18. *See supra* note 8 (collecting state bans).

19. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 2–3.

20. *See* U.S. CONST. art. I, § 8, cl. 3; U.S. CONST. art. VI, cl. 2; Federal Meat Inspection Act, 21 U.S.C. § 678; Poultry Products Inspection Act, 21 U.S.C. § 467e; *Nat'l Meat Ass'n v. Harris*, 565 U.S. 452, 468 (2012); Upside Foods, Inc. v. Comm'r, Fla. Dep't of Agric. & Consumer Servs., 171 F.4th 1239, 1246–47 (11th Cir. 2026); Complaint, Upside Foods, Inc. v. Simpson, No. 24-cv-00316 (N.D. Fla. Aug. 12, 2024) [hereinafter Florida Complaint]; Complaint, Wild Type, Inc. v. Shuford, No. 25-cv-01408 (W.D. Tex. Sep. 2, 2025) [hereinafter Texas Complaint].

21. *See* Regulation 2015/2283 of the European Parliament and of the Council of 25 November 2015 on Novel Foods, arts. 6(2), 11, 2015 O.J. (L 327) 1 (EU) [hereinafter Novel Food Regulation].

been submitted,[22] but none has been approved. The European Union's precautionary architecture is procedurally rigorous and scientifically grounded,[23] but its practical effect is to delay market access by years compared to the United States and Singapore. Within the Union, Italy has gone further still, enacting a national law that prohibits the production and sale of cell-cultivated food products entirely, creating an internal tension that will test the limits of the European Union's single market principles if and when a cultivated meat product receives Union-wide authorization.[24]

China, for its part, has adopted a third path, one that might be described as strategic patience. The Chinese government has signaled strong support for cell-cultivated protein as a strategic technology, incorporating it into the 14th Five-Year Plan for Bio-Economy Development in 2022 and directing the China National Center for Food Safety Risk Assessment (CFSA) to develop safety assessment guidelines.[25] Chinese companies have built pilot-scale production facilities,[26] and the country's largest cell-cultivated meat pilot plant completed construction in late 2025.[27] However, no commercial approval has been granted thus far. China is developing technical standards and safety assessment frameworks for cultivated meat, including through a national expert group leading standardization work within the International Organization for Standardization (ISO), while withholding commercial

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22. *See Gourmey Seeks Approval in Five Key Markets, Confirming Global Ambitions*, GOURMEY (July 26, 2024), https://gourmey.com/blogs/seeks-approval-in-five-key-markets-confirming-global-ambitions [https://perma.cc/RTP8-9ZAZ]; *Submitting Our First EU Market Authorisation Request*, MOSA MEAT: BLOG (Jan. 22, 2025), https://mosameat.com/blog/submitting-our-first-eu-market-authorisation-request [https://perma.cc/N268-8ET8].

23. *See* Alessandro Monaco, *A Perspective on the Regulation of Cultivated Meat in the European Union*, 9 NPJ SCI. FOOD 21, at 1–2 (2025).

24. *See* Legge 1 dicembre 2023, n. 172, G.U. Dec. 1, 2023, n. 293 [Law 172/2023] (It.) [hereinafter Legge n. 172/2023], https://www.gazzettaufficiale.it/eli/id/2023/12/01/23G00188/sg [https://perma.cc/6ZCW-6K2P].

25. 國家發展和改革委員會 [NAT'L DEV. & REFORM COMM'N], "十四五"生物经济发展规划 [THE 14TH FIVE-YEAR PLAN FOR BIO-ECONOMY DEVELOPMENT], (2022) [hereinafter 14TH FIVE-YEAR BIO-ECONOMY PLAN], https://www.ndrc.gov.cn/xxgk/zcfb/ghwb/202205/P020220510324220702505.pdf [https://perma.cc/7UGF-BC3Z] (China).

26. *See About Us*, JOES FUTURE FOOD, http://joesfuturefood.com/about.aspx [https://perma.cc/737Z-5853] (last visited May 12, 2026).

27. *See* Anay Mridul, *Joes Future Food Completes Construction of China's Largest Cultivated Meat Facility*, GREEN QUEEN (Dec. 16, 2025), https://www.greenqueen.com.hk/joes-future-food-lab-grown-meat-china-cultivated-pork-facility/ [https://perma.cc/LF4G-DN2B]; 周子未来建成国内最大细胞培养肉中试工厂 [*Joes Future Food Completes Construction of China's Largest Cell-Cultivated Meat Pilot Plant*], FOODTALKS (Dec. 15, 2025), https://www.foodtalks.cn/news/60481 [https://perma.cc/8CQ7-G36S].

market approval.[28] It is, in effect, building the regulatory architecture before permitting the market to emerge.

This article argues that these three regulatory trajectories are not converging, and that their divergence reflects features of each jurisdiction's legal, political, and institutional order that are unlikely to change in the near term. The American dual fragmentation is a product of federalism, interest-group politics, and a regulatory culture that delegates innovation governance to existing agencies while leaving space for subnational resistance.[29] The European precautionary approach is embedded in the Treaty structure and in EFSA's institutional mandate.[30] China's state-directed model is an expression of the Party-state's broader approach to technological governance.[31] In this model, the state simultaneously promotes innovation and controls the conditions under which innovative products enter the market.

The existing literature on cultivated meat regulation, including regularly updated industry trackers[32] and legislative updates from the National Agricultural Law Center,[33] has produced useful descriptive surveys of national frameworks. The most comprehensive academic comparative treatment to date covers the European Union, Singapore, the United States, and Australia, but does not address China.[34] Three significant gaps remain. First, the literature has not produced a sustained comparative legal analysis that moves beyond regulatory description to identify the constitutional, institutional, and political logics that drive the divergence between jurisdictions. Second, the constitutional dimensions of the American federal-state conflict have received inadequate scholarly attention, despite the fact that pending litigation in Florida and Texas raises foundational questions about federal preemption and the Commerce Clause.[35] Third, China's

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28. China Gen. Chamber of Com., *ISO Xibao Peiyangrou Tebie Gongzuozu Diyici Guonei Yantaohui Zai Jing Zhaokai* (ISO细胞培养肉特别工作组第一次国内研讨会在京召开) [First Domestic Symposium of the ISO Special Working Group on Cell-Cultured Meat Held in Beijing] (July 21, 2025), https://m.cgcc.org.cn/bzgf/3/53903.html (on file with the *Fordham Urban Law Journal*).

29. *See infra* Part I.

30. *See infra* Part II.

31. *See infra* Part III.

32. *See The Regulatory Pathway for Cultivated Meat*, GOOD FOOD INST., https://gfi.org/resource/fda-cultivated-meat-clearance-explainer/ [https://perma.cc/6P74-TWXV] (last visited May 12, 2026).

33. *See Legislative Update*, NALC, *supra* note 7.

34. *See* Hope Johnson & Alessandro Monaco, *Global Developments in the Regulation of Cultivated Meat: A Comparative Study of the European Union, Singapore, US and Australia and New Zealand*, 34 REV. EUR., COMP. & INT'L ENVTL. L. 496 (2025).

35. *See* Florida Complaint, *supra* note 20 (alleging express preemption under the FMIA and PPIA, and violation of the dormant Commerce Clause); Texas Complaint, *supra* note 20

regulatory approach has been treated superficially in the English-language literature, with little attention to how cultivated meat governance fits within the broader pattern of Chinese food safety regulation and the state's distinctive model of technology-directed industrial policy.

This article addresses these gaps. It proceeds as follows. Part I examines the United States, tracing the federal regulatory framework, the state-level backlash, and the constitutional collision now unfolding in the courts. Part II examines the European Union, analyzing the Novel Food Regulation pathway and the internal tension created by Italy's national prohibition. Part III examines China, situating its cultivated meat regulatory strategy within the broader context of Chinese food governance and industrial policy. Part IV identifies three cross-cutting dimensions of regulatory divergence: the innovation-safety trade-off, the question of definitional sovereignty over the legal meaning of "meat," and the political economy of resistance, including an assessment of each jurisdiction's vulnerability under World Trade Organization (WTO) sanitary and phytosanitary (SPS) disciplines. Part V turns to the governance gap that this non-convergence has produced, examining the architecture of fragmentation, pathways toward regulatory coordination, and the broader implications under international trade law.

I. THE UNITED STATES: FROM FEDERAL APPROVAL TO STATE CRIMINALIZATION

The United States presents the most internally contradictory regulatory landscape of the three jurisdictions examined. The federal government improvised an innovation-permissive pathway from existing statutory authority,[36] only to provoke a state-level backlash[37] that has produced criminal prohibitions and constitutional litigation now testing the limits of federal preemption.[38] This Part traces the resulting collision.

A. The Federal Framework: FDA-USDA Shared Jurisdiction

Rather than enacting new legislation, the federal government improvised a regulatory framework for cell-cultivated meat from existing statutory authority. The two agencies responsible for food safety, the FDA and FSIS, agreed to share jurisdiction under their respective existing mandates, making this institutional creativity itself a distinctive feature of the American approach. The jurisdictional architecture was formalized in a March 2019

(alleging Supremacy Clause preemption under the PPIA and dormant Commerce Clause violation).

36. *See infra* Part I.A.

37. *See infra* Part I.B.

38. *See infra* Part I.C.

Formal Agreement between the FDA and the USDA's Food Safety and Inspection Service.[39] Under this agreement, the FDA oversees the pre-harvest phase of cell-cultivated meat production: cell collection from living animals, cell banking, and all processes of cell growth, multiplication, and differentiation in bioreactor environments.[40] Regulatory authority transfers to FSIS at the point of "harvest," namely the moment when cells are removed from the controlled growth environment, and the process of converting them into food products begins.[41]

From that point forward, FSIS exercises over cell-cultivated meat the inspection, processing, packaging, and labeling authority it exercises under the Federal Meat Inspection Act[42] (FMIA) and the Poultry Products Inspection Act[43] (PPIA), for the species those statutes cover.[44] The practical significance of this arrangement is that cell-cultivated meat produced from livestock and poultry enters the American market through the same regulatory pathway as conventional meat. It receives the same USDA mark of inspection.[45] Its labels are pre-approved by FSIS under the same statutory authority.[46] The regulatory system treats cultivated chicken and conventionally raised chicken as the same category of product for purposes of food safety oversight.[47] This position has profound implications for the

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39. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 1–2; *Human Food Made with Cultured Animal Cells*, FOOD SAFETY & INSPECTION SERV., https://www.fsis.usda.gov/inspection/compliance-guidance/labeling/labeling-policies/human-food-made-cultured-animal-cells [https://perma.cc/3JA7-XQSK] (last visited May 12, 2026).

40. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, § 4.A, at 2.

41. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, § 4.A, at 2, § 4.B, at 3 (providing that "[a]t harvest," oversight transfers from HHS-FDA to USDA-FSIS, with FDA overseeing "proliferation and differentiation of cells through the time of harvest").

42. Federal Meat Inspection Act, 21 U.S.C. §§ 606–607.

43. Poultry Products Inspection Act, 21 U.S.C. §§ 455–457.

44. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 3; CRS REPORT, *supra* note 12, at 8–9. This jurisdictional division applies specifically to cultivated products from species within FSIS's existing statutory mandate: cattle, sheep, swine, goats, poultry, and catfish. 21 U.S.C. §§ 453(e)–(f), 601(j), 601(w)(2). For cultivated seafood other than catfish and for cultivated game meat, the FDA retains sole jurisdiction under the Federal Food, Drug, and Cosmetic Act (FD&C Act). 21 U.S.C. § 321(f); *see Cultured Salmon Company Receives "No Questions" Letter From FDA,* NAT'L L. REV. (July 19, 2025), https://natlawreview.com/article/cultured-salmon-company-receives-no-questions-letter-fda [https://perma.cc/B73G-7BV6].

45. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, § 4.B.1, at 3 (requiring FSIS to review whether "harvested cells are eligible to be processed into meat or poultry products that bear the USDA mark of inspection").

46. *See id.* § 4.B.4, at 3 (requiring that labeling of such products "be preapproved and then verified through inspection, as required by FSIS regulations").

47. *See id.* § 4.B.3, at 3 (requiring inspection "in accordance with applicable FSIS regulations (including sanitation and physical product inspection, Hazard Analysis and Critical Control Point (HACCP) verification, product testing, and records review)").

preemption arguments that are now being advanced in constitutional litigation challenging state bans.

Equally notable is the absence of any new statute, any new regulatory agency, or any novel legislative framework. The FDA and USDA adapted their existing authorities to accommodate a product that the drafters of their enabling statutes could not have anticipated.[48] This institutional flexibility reflects a broader feature of the American regulatory culture, a pragmatic willingness to stretch existing legal frameworks to cover new realities, combined with a preference for agency-level accommodation, prompted by congressional direction in an appropriations report rather than by substantive legislation.[49]

The pathway proceeds in two stages. The mechanics of the FDA's pre-market consultation process, the first stage, deserve closer examination, as they illustrate the federal approach in operation. The Federal Food, Drug, and Cosmetic Act (FD&C Act) imposes no general pre-market approval requirement for food,[50] and the FDA has not created one for cultivated meat.[51] The consultation process is therefore technically voluntary, in the sense that no statute obliges a cultivated meat company to submit to FDA consultation before commencing production. FSIS personnel are not to formally review an application for a grant of inspection until the establishment has completed the FDA consultation and the FDA has transmitted its findings to FSIS.[52] During the consultation, a company

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48. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, § 3, at 1–2 (setting out the parties' existing statutory authorities under the FD&C Act, FMIA, PPIA, and EPIA); FDA-USDA FORMAL AGREEMENT, *supra* note 16, § 4.C.2, at 4 (contemplating a future "joint process to identify any changes needed to statutory or regulatory authorities"); *see also* CRS REPORT, *supra* note 12, at 8–9, 13 (noting that Congress directed the agencies to conclude a formal agreement in February 2019 and that bills addressing cell-cultivated meat were introduced but none enacted).

49. *See* CRS REPORT, *supra* note 12, at 8 (observing that joint FDA-FSIS regulation "is not unusual" and that the agencies "often share overlapping responsibilities for some food products and have developed memoranda of understanding").

50. *See* 21 U.S.C. §§ 342, 348; *First Consultation*, FDA, *supra* note 3 ("The voluntary pre-market consultation is not an approval process.").

51. *First Consultation*, FDA, *supra* note 3.

52. *See* USDA, Food Safety & Inspection Serv., FSIS Directive 7800.1, *FSIS Responsibilities in Establishments Producing Cell-Cultured Meat and Poultry Food Products*, Grant of Inspection (June 21, 2023) [hereinafter FSIS Directive 7800.1], https://www.fsis.usda.gov/policy/fsis-directives/7800.1 [https://perma.cc/4V2R-YHK4] ("OFO frontline supervisors (FLS), district managers (DM), and grant curators (GC) are not to formally review GOI applications from establishments that harvest cells for cell-cultured meat or poultry food products until the establishment has successfully completed the FDA premarket consultation process and FDA has provided FSIS with its official findings and supporting documentation."). The agreement between the agencies expressly disclaims binding effect. FDA-USDA FORMAL AGREEMENT, *supra* note 16, § 5, at 4 ("It does not create binding, enforceable obligations against either Agency."). The consultation operates as a

submits a comprehensive package of information to the FDA, including descriptions of the cell lines and cell banks, the manufacturing controls, and the components and inputs used in production.[53] After evaluating the submitted information, the FDA scientists may issue a "no questions" letter if the product and its manufacturing process raise no safety concerns requiring further investigation. The letter is not a formal "approval" in the regulatory sense. It is a communication that the FDA has no further questions about the firm's own safety conclusion.[54] But in practical effect it functions as a gateway, since FSIS determines eligibility for the mark of inspection on the basis of information the FDA supplies at harvest.[55]

The FSIS grant of inspection is the second critical step. Cell-cultivated meat production facilities are treated as dual-jurisdiction establishments, a category that already existed for facilities subject to the oversight of both agencies, subject to FDA oversight during the pre-harvest phase and to FSIS oversight from the point of harvest onward.[56] A company must apply for and obtain an FSIS grant of inspection before it may sell cell-cultivated meat or poultry products bearing the USDA mark of inspection.[57] FSIS Directive 7800.1 provides detailed instructions to its inspection program personnel regarding their roles and responsibilities in cell-cultivated meat establishments.[58] Although cell-cultivated meat is not subject to the carcass-by-carcass inspection required for conventional slaughter, personnel conduct inspection and verification activities at least once per shift when an establishment is harvesting or processing cell-cultured products.[59] Labels for these products fall outside generic approval and must be submitted to

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general statement of policy or agency procedure rather than as a substantive rule, and is therefore exempt from notice-and-comment requirements. *See* 5 U.S.C. § 553(b)(A).

53. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, § 4.A.1, at 2; CRS REPORT, *supra* note 12, at 9.

54. *See First Consultation*, FDA, *supra* note 3 ("The voluntary pre-market consultation is not an approval process. Instead, it means that after our careful evaluation of the data and information shared by the firm, we have no further questions at this time about the firm's safety conclusion.").

55. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 2–3.

56. *See* FSIS Directive 7800.1, *supra* note 52, § III.C, at 2–3 (classifying establishments that harvest cells for cell-cultured products as dual jurisdiction establishments and directing IPP to follow FSIS Directive 5730.1, which provides instructions for any establishment subject to the jurisdiction of both agencies); FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 2–3.

57. *See* 21 U.S.C. §§ 455, 459; 9 C.F.R. §§ 381.1, 381.25 (2026); FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 4.

58. *See* FSIS Directive 7800.1, *supra* note 52, § III.B.

59. *See* FSIS Directive 7800.1, *supra* note 52, § III.B, at 2.

FSIS for evaluation.[60] Consequently, cell-cultivated meat is subject to substantially the same regulatory oversight as conventional meat, a choice made deliberately rather than by default.[61] This alignment appears deliberate rather than incidental, since the agencies chose to route the product through existing authorities rather than constructing a separate regime.

The first companies to complete this pathway were UPSIDE Foods and GOOD Meat.[62] UPSIDE Foods completed the FDA's pre-market consultation process in November 2022, becoming the first cell-cultivated meat company to receive a "no questions" letter from the agency.[63] The agency stated that, after evaluating the data and information the firm submitted, it had "no further questions at this time about the firm's safety conclusion."[64] GOOD Meat completed the same process in March 2023.[65] Both companies subsequently applied for and received USDA grants of inspection for their production facilities, and both obtained FSIS label approval for their cultivated chicken products.[66] In June 2023, FSIS issued the landmark grants of inspection.[67] The following month, both companies began commercial sales: UPSIDE Foods at Bar Crenn in San Francisco and GOOD Meat at China Chilcano in Washington, D.C.[68]

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60. *See* 9 C.F.R. §§ 412.1, 412.2 (2026) (setting out the categories of labels eligible for generic approval, which do not include products derived from cultured animal cells); *Human Food Made with Cultured Animal Cells*, *supra* note 39.

61. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, §§ 4.B.2–4.B.3, at 3; FSIS Directive 7800.1, *supra* note 52, § III.B.

62. *See First Consultation*, FDA, *supra* note 3; *FDA Completes Second Pre-Market Consultation for Human Food Made Using Animal Cell Culture Technology*, U.S. FOOD & DRUG ADMIN. (Mar. 21, 2023) [hereinafter FDA, *Second Consultation*], https://www.fda.gov/food/hfp-constituent-updates/fda-completes-second-pre-market-consultation-human-food-made-using-animal-cell-culture-technology [https://perma.cc/X5TV-UJ9N].

63. *See First Consultation*, FDA, *supra* note 3. Without a completed consultation, a firm cannot proceed to the grant of inspection and label approval that FSIS requires before sale. FSIS Directive 7800.1, *supra* note 52, § III.B. The letter is not an approval, and the firm remains responsible for its own safety conclusion. *First Consultation*, FDA, *supra* note 3.

64. *See First Consultation*, FDA, *supra* note 3.

65. *See* FDA, *Second Consultation*, *supra* note 62.

66. *See* CRS REPORT, *supra* note 12, at 10. A grant of inspection makes a production facility an official establishment under the PPIA. 9 C.F.R. § 381.25 (2026). Federal inspectors are assigned to it, its products may bear the official mark of inspection, and poultry products may be processed for commerce only within such an establishment. 9 C.F.R. §§ 381.1, 381.25 (2026); 21 U.S.C. § 459. Without it the product cannot lawfully be sold. 21 U.S.C. § 455.

67. *See* CRS REPORT, *supra* note 12, at 3.

68. *See UPSIDE Foods Makes History*, *supra* note 1; *GOOD Meat & José Andrés Make Historic U.S. Sale of Cultivated Chicken*, BUS. WIRE (July 5, 2023), https://www.businesswire.com/news/home/20230705288470/en/GOOD-Meat-Jos-Andrs-Make-Historic-U.S.-Sale-of-Cultivated-Chicken [https://perma.cc/WJY9-WWM2].

The federal regulatory pathway has continued to expand. By early 2026, the FDA had issued five "no questions" letters for cultivated meat products: UPSIDE Foods, GOOD Meat, Mission Barns, Wildtype, and Believer Meats.[69] The agencies have reiterated the shared jurisdictional framework and outlined further steps: the FDA announced its intention to issue draft guidance for industry on the pre-market consultation process, and the USDA announced its intention to propose specific labeling regulations for cell-cultivated meat and poultry products.[70] As of early 2026, no final labeling rule has been issued,[71] and FSIS continues to approve labels on a case-by-case basis under an interim process.[72]

The approach has produced rapid market access relative to other jurisdictions.[73] But it has also created the conditions for the constitutional conflict that now defines American food federalism, because the very success of the federal framework has provoked a state-level political backlash that challenges its legitimacy and reach.

B. The State Revolt: Eight Bans and Counting

The state-level response to cell-cultivated meat has been swift and overwhelmingly hostile. Between May 2024 and July 2026, eight states enacted statutory prohibitions on the manufacture, sale, or distribution of cell-cultivated meat, with additional states imposing labeling restrictions,

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69. As of early 2026, the FDA had issued five "no questions" letters: to UPSIDE Foods (Nov. 2022), GOOD Meat (Mar. 2023), Mission Barns (Mar. 2025), Wildtype (May 2025), and Believer Meats (July 2025). *See* FDA, *Inventory of Completed Pre-Market Consultations with Human Food Made from Cultured Animal Cells*, FOOD & DRUG ADMIN. [hereinafter *Pre-Market Inventory*, FDA], https://www.fda.gov/food/human-food-made-cultured-animal-cells/inventory-completed-pre-market-consultations-human-food-made-cultured-animal-cells [https://perma.cc/BV68-UN99] (last visited May 12, 2026).

70. *See* Kerensa Gimre, Brian Sylvester & Thomas Tobin, *USDA Issues New Directives as Cell-Cultured Meat Moves to Market*, JD SUPRA (July 13, 2023), https://www.jdsupra.com/legalnews/usda-issues-new-directives-as-cell-3745997/ [https://perma.cc/AD7E-2CX3].

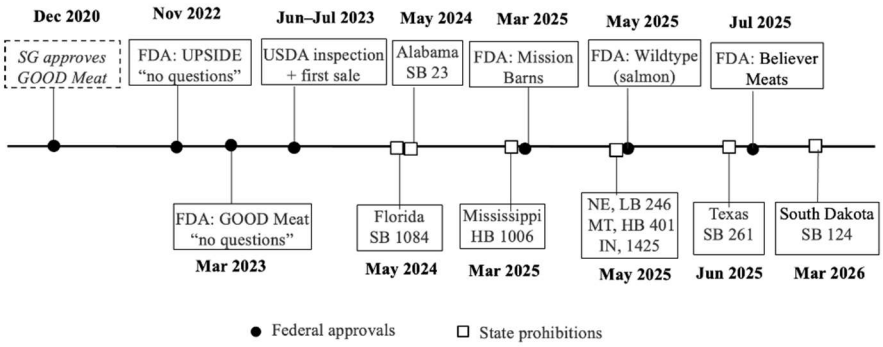
71. Labeling of Meat or Poultry Products Comprised of or Containing Cultured Animal Cells, 86 Fed. Reg. 49,491 (Sep. 3, 2021) (advance notice of proposed rulemaking).

72. *See* 9 C.F.R. § 412.1 (2026) (requiring submission of labels not generically approved); *Human Food Made with Cultured Animal Cells*, *supra* note 39. Approved labels are not published as a set. For the policy applied in evaluating meat and poultry labels generally, *see generally* FOOD SAFETY & INSPECTION SERV., *FOOD STANDARDS AND LABELING POLICY BOOK*, FSIS-GD-2005-0003 (May 2026), https://www.usda.gov/guidance-documents/labeling/fsis/food-standards-and-labeling-policy-book [https://perma.cc/6H3A-WA5V] (setting out the general labeling policy FSIS applies in the absence of a cultivated-meat-specific rule).

73. *See* CRS REPORT, *supra* note 12, at 10; *see also infra* Parts II–III. The European Union: The Precautionary Architecture and Part III. China: Standards Before Markets (comparing the European Union and Chinese pathways, under which no product has yet reached the market).

purchasing bans, and other regulatory constraints.[74] Figure 1 maps the resulting collision: as the federal agencies progressively expanded the number of approved cultivated meat products between 2022 and 2025, state legislatures moved in the opposite direction with an accelerating series of outright prohibitions, most of which carry criminal penalties.[75]

Figure 1. The Dual Fragmentation: Federal Approvals and State Prohibitions[76]



Florida was first. On May 1, 2024, Governor Ron DeSantis signed Senate Bill 1084, an appropriations bill that included a provision making it "unlawful for any person to manufacture for sale, sell, hold or offer for sale, or distribute cultivated meat" in the state.[77] The statute defines cultivated meat as "any meat or food product produced from cultured animal cells."[78] Violations are classified as second-degree misdemeanors, and food establishments found in violation are subject to license suspension.[79] Alabama followed within days. On May 7, 2024, Governor Kay Ivey signed

74. *See* sources cited *infra* notes 77–90.

75. *See infra* Figure 1.

76. Note: Singapore is included as a reference point for the global regulatory timeline. State prohibition dates reflect the date of gubernatorial signature. *Source:* Author's compilation based on the *Pre-Market Inventory*, FDA, *supra* note 69 (federal "no questions" letters); CRS REPORT, *supra* note 12, at 3 (federal grants of inspection); the state prohibition statutes cited *supra* notes 7–8 (state bans); and Aravindan & Geddie, *infra* note 147 (Singapore approval of GOOD Meat, December 2020).

77. S.B. 1084, 2024 Leg., Reg. Sess. (Fla. 2024) (codified at FLA. STAT. § 500.452(1) (2024)).

78. FLA. STAT. § 500.03(1)(k) (2024).

79. FLA. STAT. § 500.452 (2024).

Senate Bill 23[80], which prohibits the manufacturing, selling, holding or offering for sale, or distribution of any "cultivated food product."[81]

The pace of state action accelerated markedly in 2025. In March, Mississippi's legislature unanimously passed House Bill 1006, becoming the third state to enact an outright ban.[82] The statute criminalizes the manufacture, sale, or distribution of cultivated food products, with violations punishable by fines of up to $500 or three months' imprisonment.[83] In May, Nebraska enacted Legislative Bill 246, classifying cultivated-protein food products as adulterated food under state law, making their manufacture, production, import, distribution, promotion, or sale unlawful and additionally subjecting violators to the state's Uniform Deceptive Trade Practices Act.[84] Montana followed with House Bill 401, signed by Governor Gianforte on May 1, 2025.[85] Indiana took a somewhat different approach with House Bill 1425, establishing a two-year moratorium on the sale and manufacturing of cultivated meat from July 1, 2025, to June 30, 2027, after which cultivated meat products sold in the state must bear the label: "This is an imitation meat product."[86] Texas concluded the 2025 wave when Governor Greg Abbott signed Senate Bill 261 on June 20.[87] The bill imposes a two-year ban effective September 1, 2025, with administrative penalties of up to twenty-five thousand dollars per day, each day of continuing violation treated as a separate offense.[88] It also removed cell-cultured protein from

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80. NAT'L AGRIC. L. CTR., Cell-*Cultured Meat Updates: State Bans, Labeling Requirements, and Regulatory Clarifications* (June 6, 2024), https://nationalaglawcenter.org/cell-cultured-meat-updates-state-bans-labeling-requirements-and-regulatory-clarifications/ [https://perma.cc/RE6H-JSYN].

81. S.B. 23, 2024 Leg., Reg. Sess. (Ala. 2024) (codified at ALA. CODE § 20-1-161 (2024)); NAT'L AGRIC. L. CTR., *supra* note 80.

82. H.B. 1006, 2025 Leg., Reg. Sess. (Miss. 2025) (codified at MISS. CODE ANN. § 75-35-15 (2025)).

83. *Id.*

84. Legis. B. 246, 109th Leg., 1st Sess. (Neb. 2025) (codified at NEB. REV. STAT. § 81-2282 (2025)).

85. H.B. 401, 69th Leg., Reg. Sess. (Mont. 2025) (codified at MONT. CODE ANN. §§ 50-31-501(6), 50-31-511 (2025)).

86. H.B. 1425, 124th Gen. Assemb., 1st Reg. Sess. (Ind. 2025) (codified at IND. CODE § 15-17-5-6.1 (2025)).

87. S.B. 261, 89th Leg., Reg. Sess. (Tex. 2025); *History of S.B. 261*, TEX. LEGISLATURE ONLINE, https://capitol.texas.gov/BillLookup/History.aspx?LegSess=89R&Bill=SB261 [https://perma.cc/XC64-SSSM] (last visited Sep. 16, 2026).

88. Tex. S.B. 261; TEX. HEALTH & SAFETY CODE ANN. §§ 431.02105, 431.054(c)–(d), 433.057 (West 2025); Madyson Fitzgerald, *Texas Becomes Seventh State to Ban Lab-Grown Meat*, STATELINE (June 30, 2025), https://stateline.org/2025/06/30/texas-becomes-seventh-state-to-ban-lab-grown-meat/ [https://perma.cc/FB7Z-F23K].

the statutory definitions of meat, poultry, fish, and egg.[89] South Dakota became the eighth state to enact a ban when S.B. 124 was signed into law in March 2026, imposing a five-year prohibition on the manufacture, sale, and distribution of cell-cultured protein, effective July 1, 2026.[90]

Beyond the eight outright bans, a broader regulatory pattern has emerged. Iowa enacted legislation banning cell-cultured meat from school meals and imposing labeling requirements.[91] South Dakota imposed a five-year moratorium on the sale and distribution of cell-cultured protein.[92] North Dakota mandated a study of the regulatory implications of a potential ban.[93] Tennessee imposed permit requirements and labeling mandates.[94] In total, twenty-two state legislatures have enacted food labeling requirements applicable to cell-cultivated meat and other alternative proteins.[95]

The political economy of this legislative movement is revealing. The states that have enacted outright bans are concentrated among livestock producers. Texas and Nebraska hold the two largest cattle inventories in the country.[96] Collectively, the eight states account for roughly twenty-nine percent of the national cattle and calf inventory, though they make up only sixteen percent of the states.[97] The public advocacy surrounding these measures makes little effort to disguise the protectionist motivation. The Texas and Southwestern Cattle Raisers Association applauded the Texas ban as a measure that would "prevent Texas consumers from being a science

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89. Tex. S.B. 261, § 3; TEX. HEALTH & SAFETY CODE ANN. § 431.0805(4)–(10) (West 2025) (providing that each term "does not include an analogue product or cell-cultured protein").

90. S.B. 124, 2026 Leg., Reg. Sess. (S.D. 2026) (prohibiting the manufacture, sale, and distribution of cell-cultured protein from July 1, 2026, to June 30, 2031, with violations constituting a Class 2 misdemeanor).

91. IOWA CODE §§ 137E.1–137E.6, 260C.10(2), 262.25D(2), 283A.12(2) (2026).

92. S.B. 124, 2026 Leg., Reg. Sess. (S.D. 2026) (prohibiting the manufacture, sale, and distribution of cell-cultured protein from July 1, 2026, to June 30, 2031, with violations constituting a Class 2 misdemeanor).

93. *See* H.B. 1151, 69th Legis. Assemb., Reg. Sess. (N.D. 2025).

94. *See* S.B. 931, 114th Gen. Assemb., 1st Reg. Sess. (Tenn. 2025).

95. *See Legislative Update*, NALC, *supra* note 7.

96. *See* USDA, NAT'L AGRIC. STAT. SERV., *CATTLE* 5 (Jan. 31, 2025), https://esmis.nal.usda.gov/sites/default/release-files/h702q636h/sf26b275x/h989sz55j/catl0125.pdf [https://perma.cc/7KHA-59MD] (reporting 12.2 million head in Texas, 6.05 million in Nebraska, and 5.95 million in Kansas).

97. *See id*. The eight states reported the following all cattle and calves inventories as of January 1, 2025, in thousands of head: Texas, 12,200; Nebraska, 6,050; South Dakota, 3,550; Montana, 2,160; Florida, 1,560; Alabama, 1,180; Indiana, 810; and Mississippi, 810. Their combined inventory of 28,320 thousand head represents 32.7 percent of the national total of 86,662.2 thousand head. The eight states constitute 16 percent of the fifty states. *See also* DeSantis Press Release, *supra* note 10.

experiment."[98] Governor DeSantis framed the Florida ban as a defense of traditional animal agriculture, announcing that Florida was "fighting back against the global elite's plan to force the world to eat meat grown in a petri dish or bugs to achieve their authoritarian goals."[99]

Absent from the legislative record of these bans is any scientific evidence that cell-cultivated meat poses a risk to human health. None of the banning statutes contains findings, and none cites a risk assessment, a toxicological study, or food safety data.[100] In Florida the prohibition arrived as two sections of an omnibus agriculture bill whose Senate analysis records no finding on the product's safety.[101] In Texas and Nebraska the accompanying materials turn instead on the protection of domestic agriculture.[102] The economic self-interest of the traditional livestock industry is the recurring thread connecting these measures.

The political alignment of the cultivated meat bans is also noteworthy. The Department of Health and Human Services, under Secretary Robert F. Kennedy Jr., listed the state bans on its website as examples of the "Make America Healthy Again" movement.[103] This branding has been linked to a more extensive populist health agenda, which includes a range of concerns regarding "ultra-processed" foods, skepticism towards the pharmaceutical industry, and a prioritization of what is termed "natural" food production methods.[104] This political alignment transforms the cultivated meat question from a technical regulatory issue into a cultural signifier, a marker of identity in a broader contest over the meaning of food, health, and authenticity in American life. The absence of scientific substantiation in this context is

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98. *Texas Becomes Seventh State to Ban Cultivated Meat*, FOOD SAFETY MAG. (June 25, 2025), https://www.food-safety.com/articles/10473-texas-becomes-seventh-state-to-ban-cultivated-meat [https://perma.cc/C25Q-9B84].

99. DeSantis Press Release, *supra* note 10.

100. *See* ALA. CODE § 20-1-161 (2024); FLA. STAT. § 500.452 (2025); IND. CODE § 15-17-5-6.1 (2025); MISS. CODE ANN. § 75-35-15 (2025); MONT. CODE ANN. §§ 50-31-501(6), 50-31-511 (2025); NEB. REV. STAT. § 81-2282 (2025); TEX. HEALTH & SAFETY CODE ANN. § 433.057 (West 2025).

101. *See* FLA. S. COMM. ON FISCAL POLICY, BILL ANALYSIS AND FISCAL IMPACT STATEMENT, CS/CS/S.B. 1084, 2024 Reg. Sess., at 18–19 (Fla. Feb. 23, 2024) [hereinafter FLA. S.B. 1084 BILL ANALYSIS], https://www.flsenate.gov/Session/Bill/2024/1084/Analyses/2024s01084.fp.PDF [https://perma.cc/3GYP-CVLS].

102. *See, e.g.*, TEX. S.B. 261 BILL ANALYSIS, *supra* note 17 (stating that cell-cultured products could disrupt traditional livestock markets and that the measure would support traditional agriculture); Bamer, *supra* note 17 (reporting the Nebraska governor, a hog farmer, presenting the prohibition as a defense of the state's agricultural industry).

103. *See* U.S. Dep't of Health & Hum. Servs., *Make America Healthy Again*, HHS.GOV, https://www.hhs.gov/maha/index.html [https://perma.cc/D3AX-YSE4] (last visited July 26, 2026) (select "lab-grown meat" in the New State Policies tracker).

104. *See* Smith-Schoenwalder, *supra* note 7.

significant not only in terms of food policy but also in the contexts of constitutional and international trade law, a point which is elaborated upon in Part IV of this article.

C. The Constitutional Collision

The conflict between federal approval and state prohibition of cell-cultivated meat has produced constitutional litigation that may define the boundaries of food federalism for a generation. Two cases are currently pending.

In August 2024, UPSIDE Foods filed suit in the Northern District of Florida challenging the constitutionality of Florida's ban.[105] The complaint advances two principal arguments. First, UPSIDE Foods contends that the ban violates the dormant aspect of the Commerce Clause, alleging that it was enacted with a discriminatory purpose and operates with a discriminatory effect, benefiting in-state agricultural interests at the expense of out-of-state competitors.[106] Second, and more consequentially, UPSIDE Foods argues that the Poultry Products Inspection Act (PPIA) expressly preempts the Florida ban.[107] Express preemption applies when Congress has stated in the statute itself that state law is displaced.[108] UPSIDE Foods contends that Congress, through the PPIA, has enacted a regulatory framework governing the production, inspection, processing, packaging, labeling, and distribution of poultry products. Its cell-cultivated chicken, having received FSIS label approval and a grant of inspection, falls squarely within the reach of that clause.[109]

A similar challenge was filed in Texas following the enactment of SB 261, brought by Wildtype and UPSIDE Foods.[110] The Texas litigation raises the same Commerce Clause and Supremacy Clause arguments, with additional emphasis on the economic harm suffered by companies that have invested

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105. *See* Florida Complaint, *supra* note 20; *Institute for Justice Files Lawsuit Challenging Florida's Ban on Cultivated Meat*, INST. FOR JUST., https://ij.org/case/florida-cultivated-meat-ban/ [https://perma.cc/B7DH-MFXR] (last visited Sep. 12, 2026).

106. *See* Florida Complaint, *supra* note 20, ¶¶ 5, 153–57, 160 (alleging that no cultivated meat is produced within Florida).

107. *See* Florida Complaint, *supra* note 20, ¶¶ 131–42. *But see* Upside Foods, Inc. v. Comm'r, Fla. Dep't of Agric. & Consumer Servs., 171 F.4th 1239, 1256–57 (11th Cir. 2026) (affirming the denial of a preliminary injunction and holding that the express preemption clause does not reach an outright ban on sale).

108. *See* ERWIN CHEMERINSKY, CONSTITUTIONAL LAW: PRINCIPLES AND POLICIES 383 (7th ed. 2024); Cipollone v. Liggett Grp., Inc., 505 U.S. 504, 516 (1992).

109. *See* Florida Complaint, *supra* note 20, ¶¶ 43–45, 121–22, 129–31, 140, 147–48.

110. *See* Texas Complaint, *supra* note 20; Jacob Sullum, *The New Texas Ban on Cell-Cultured Protein Is an Unconstitutional Interstate Trade Barrier, a Lawsuit Says*, REASON (Sep. 4, 2025), https://reason.com/2025/09/04/the-new-texas-ban-on-cell-cultured-protein-is-an-unconstitutional-interstate-trade-barrier-a-lawsuit-says/ [https://perma.cc/EJH7-YNJ2].

substantial resources in complying with the federal regulatory framework only to find their products banned in major markets.[111]

The preemption argument is doctrinally strong, and it operates on multiple levels that merit separate analysis. The PPIA expressly provides that states may not impose "marking, labeling, packaging, or ingredient requirements" on federally inspected poultry products in addition to, or different from, those established under federal law.[112] FSIS has, in fact, the statutory authority to inspect establishments that harvest and process cell-cultivated chicken, and no such product may be sold without a grant of inspection and preapproved labeling.[113] A state law that prohibits the sale of a USDA-inspected and USDA-labeled poultry product does more than impose different requirements; it nullifies the federal regulatory determination altogether. This is a considerably stronger preemption case than many food federalism disputes, where the question is typically whether a state has imposed more stringent requirements in an area of concurrent regulation.[114] Here, the state has not imposed stricter standards but has flatly prohibited what the federal government has expressly authorized.

The doctrinal analysis should extend further still. The Federal Meat Inspection Act (FMIA) contains a parallel preemption clause, which provides that states may not impose "marking, labeling, packaging, or ingredient requirements . . . in addition to, or different than" those established under the FMIA with respect to federally inspected meat products.[115] This is directly relevant to the Texas litigation, where Senate Bill 261's prohibition encompasses any food product made from cell culture derived from a live animal cell, a class that takes in the whole of FSIS's statutory mandate and extends beyond it.[116] Read together, the PPIA and FMIA preemption clauses bar states from imposing such requirements, and

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111. *See* Texas Complaint, *supra* note 20, ¶ 6.

112. Poultry Products Inspection Act, 21 U.S.C. § 467e.

113. *See supra* Part I.A; FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 3; *Human Food Made with Cultured Animal Cells*, *supra* note 39.

114. *Cf.* WEN W. SHEN & DOROTHY C. KAFKA, CONG. RSCH. SERV., R48915, PREEMPTION AND THE FEDERAL FOOD, DRUG, AND COSMETIC ACT (FD&C ACT) 35 (2026), https://www.congress.gov/crs-product/R48915 (on file with the *Fordham Urban Law Journal*) (explaining that courts assessing FD&C Act preemption typically undertake a granular comparison of whether state requirements are "different from or in addition to" federal ones, reflecting states' concurrent role in regulating these products).

115. Federal Meat Inspection Act, 21 U.S.C. § 678.

116. *See* TEX. HEALTH & SAFETY CODE ANN. § 433.057(a)–(b) (West 2025) (defining "cell-cultured protein" as a food product "derived from harvesting animal cells and artificially replicating those cells in a growth medium to produce tissue," and providing that a person "may not manufacture, process, possess, distribute, offer for sale, or sell" such a product for human consumption).

National Meat Ass'n v. Harris, 565 U.S. 452 (2012) confirms that the bar reaches state laws that achieve the same end indirectly.[117]

Beyond field preemption, the cultivated meat bans present an unusually compelling case for conflict preemption, a distinct doctrinal category that applies where compliance with both the federal and state laws is a "physical impossibility" or where the state law "stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress."[118] The conflict here is not subtle: the federal government, acting through the FDA and FSIS, has evaluated specific cell-cultivated meat products, concluded that they are safe for human consumption, and authorized their sale with the USDA mark of inspection. The state governments have declared the same products illegal. A company holding a valid FSIS grant of inspection and an approved USDA label for its cultivated chicken cannot simultaneously utilize its federal authorization to sell the product while complying with the state prohibition against selling it. Under the Supremacy Clause, where federal and state law are in irreconcilable conflict, federal law prevails.

The states' principal defense is likely to be that their bans are exercises of the traditional police power, specifically, the power to protect public health, safety, and morals.[119] The statutes themselves contain no findings or statement of purpose. Those interests appear instead in the legislative materials, which invoke consumer protection and the preservation of traditional agriculture.[120] But the factual record undermines these claims. The consumer protection rationale fails because no banning state has produced or cited any evidence that cell-cultivated meat poses a risk to consumers. The moral or cultural rationale, that states have a legitimate interest in prohibiting food products that offend the values of their citizenry, is a more novel argument, but it collides with the structural logic of the federal meat inspection system, under which Congress barred states from imposing marking, labeling, packaging, or ingredient requirements in

117. *See* 565 U.S. 452, 468 (2012); 21 U.S.C. §§ 678, 467e.

118. *See* Geier v. Am. Honda Motor Co., 529 U.S. 861, 873–74 (2000) (applying obstacle preemption to invalidate a state tort claim that conflicted with federal regulatory objectives, even absent express preemption language); Hines v. Davidowitz, 312 U.S. 52, 67 (1941) (articulating the foundational "obstacle preemption" standard, under which state law is preempted if it "stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress").

119. *See* Jacobson v. Massachusetts, 197 U.S. 11, 24–27 (1905) (upholding compulsory vaccination as an exercise of the state's authority to protect the public health); Plumley v. Massachusetts, 155 U.S. 461, 472 (1894) (sustaining a state prohibition on the sale of colored oleomargarine as a measure against deception in the sale of food).

120. *See, e.g.*, TEX. S.B. 261 BILL ANALYSIS, *supra* note 17 (stating that the bill "would prohibit the production and sale of cell-cultured protein products within Texas to protect consumers and support traditional agriculture").

addition to or different than those made under the Acts.[121] The effect is to keep the national food supply from balkanizing into a patchwork of inconsistent state regulation. As Part IV discusses, this absence of scientific justification also exposes the state bans to challenge under the WTO's SPS Agreement.

The dormant Commerce Clause argument is equally substantial, though it follows a different doctrinal path. The dormant Commerce Clause prohibits state legislation that discriminates against or unduly burdens interstate commerce, even in the absence of conflicting federal legislation.[122] The cultivated meat bans burden interstate commerce by preventing the sale within banning states of products that are lawfully produced, federally approved, and freely marketed in other states.[123] They also arguably discriminate against out-of-state businesses: UPSIDE Foods, Wildtype, and GOOD Meat are all based in California, which permits the legal production of cultivated meat, and they have made substantial capital investments in reliance on the federal regulatory framework.[124] The challengers argue that the bans are motivated not by legitimate local concerns about health and safety but by economic protectionism on behalf of in-state livestock producers,[125] a purpose that the dormant Commerce Clause was designed to prevent.[126]

The litigation remains in its early stages, though it has already produced notable rulings. In April 2025, the Northern District of Florida denied the state's motion to dismiss UPSIDE Foods's dormant Commerce Clause claim, while dismissing the company's preemption claims under the PPIA.[127] The case thus proceeds on the theory that Florida's ban discriminates against interstate commerce, which constitutes a narrower but significant foundation

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121. 21 U.S.C. §§ 451, 467e, 602, 678; *see* Nat'l Meat Ass'n v. Harris, 565 U.S. at 466.

122. *See* Pike v. Bruce Church, Inc., 397 U.S. 137, 142 (1970) (establishing the balancing test for dormant Commerce Clause challenges, under which a state law that imposes an incidental burden on interstate commerce will be upheld unless the burden is clearly excessive in relation to the putative local benefits).

123. *See* Dean Milk Co. v. City of Madison, 340 U.S. 349, 354 (1951) (invalidating a local ordinance restricting the sale of milk not pasteurized within five miles of the city, notwithstanding the asserted health justification, where reasonable nondiscriminatory alternatives were available).

124. *See* Hunt v. Wash. State Apple Advert. Comm'n, 432 U.S. 333, 350–52 (1977) (invalidating a facially neutral labeling statute that raised the costs of doing business for out-of-state growers while leaving local growers unaffected); *see also* Bacchus Imports, Ltd. v. Dias, 468 U.S. 263, 270–73 (1984) (looking to both the purpose and the effect of a measure in assessing discrimination).

125. Florida Complaint, *supra* note 20, ¶¶ 64, 160.

126. *See* Philadelphia v. New Jersey, 437 U.S. 617, 623–24 (1978).

127. Upside Foods, Inc. v. Simpson, No. 4:24-cv-316, slip op. at 20 (N.D. Fla. Apr. 25, 2025) [hereinafter Florida Order] (denying UPSIDE's preemption claim but permitting dormant Commerce Clause challenge to proceed); *Legislative Update*, NALC, *supra* note 7.

for the challenge. Neither case has produced a dispositive ruling as of early 2026. But the constitutional questions raised are profound. They ask whether a state may criminalize the sale of a food product that has been evaluated, approved, and inspected by two federal agencies under existing federal law. This question is pivotal in determining the extent of the federal government's authority over the national food supply and the boundaries of state police power within a domain of comprehensive federal regulation. The outcome will shape not only the future of cultivated meat in America but the broader constitutional framework governing state-level food regulation in an era of increasing federal-state regulatory divergence.

II. THE EUROPEAN UNION: THE PRECAUTIONARY ARCHITECTURE

The European Union has channeled cell-cultivated meat into its established precautionary architecture, producing an approach that is neither prohibitory nor permissive but procedurally demanding. The result is a framework that is scientifically rigorous, structurally slow, and increasingly strained by internal dissent. This Part examines how that architecture operates in practice and the tensions it has generated. This Part traces that architecture in three steps, moving from the Novel Food Regulation and its authorization pathway,[128] to Italy's national prohibition and the treaty tension it creates,[129] to the European approach understood as structural delay rather than prohibition.[130]

A. The Novel Food Regulation Framework

Cell-cultivated meat enters the European Union's regulatory system through a single gateway: the Novel Food Regulation.[131] Unlike the American system, where federal agencies apply existing food safety statutes to novel products without creating new regulatory categories, the European Union system channels all novel food products through a dedicated authorization procedure that imposes substantial evidentiary burdens on applicants. Regulation (EU) 2015/2283, which replaced the earlier Regulation (EC) No 258/97,[132] establishes the framework governing the authorization of "novel foods," which are defined as foods that were not consumed to a significant degree within the Union before May 15, 1997.[133]

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128. *See infra* Part II.A.

129. *See infra* Part II.B.

130. *See infra* Part II.C.

131. Novel Food Regulation, *supra* note 21, arts. 3(2)(a)(vi), 6(2).

132. Regulation 258/97 of the European Parliament and of the Council of 27 January 1997 Concerning Novel Foods and Novel Food Ingredients, 1997 O.J. (L 43) 1 (EC).

133. Novel Food Regulation, *supra* note 21, art. 3(2)(a).

Cell-cultivated meat, which did not exist as a commercial product before that date, falls unambiguously within this definition. There is no alternative pathway.

The authorization pathway proceeds in defined stages. An applicant submits a comprehensive dossier to the European Commission, which forwards it to EFSA for scientific risk assessment.[134] The dossier must include detailed information on the production process, compositional data, toxicological studies, nutritional assessments, and proposed conditions of use.[135] EFSA's scientific panels evaluate the submission against the standard of whether the novel food, under its proposed conditions of use, is safe.[136] This determination requires the applicant to demonstrate, on the basis of available scientific evidence, that the novel food does not pose a safety risk to human health.[137] The Regulation gives EFSA nine months to adopt its opinion, a period that may be extended where EFSA requests additional information from the applicant.[138] Following EFSA's opinion, the European Commission prepares a draft implementing act authorizing or refusing the application.[139] If authorized, the novel food is added to the *Union List of Authorised Novel Foods* with specific conditions: its legal name, the food categories in which it may be used, and the maximum quantities permitted.[140] Authorizations are strictly product-specific. The authorization attaches to the novel food as specified in the Union list entry, not to the category.[141] A product whose specifications differ requires its own entry, and where the first

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134. Novel Food Regulation, *supra* note 21, arts. 10–12; Commission Implementing Regulation 2017/2469 of 20 December 2017, Laying Down Administrative and Scientific Requirements for Applications Referred to in Article 10 of Regulation (EU) 2015/2283, 2017 O.J. (L 351) 64 [hereinafter Regulation 2017/2469].

135. EFSA Panel on Nutrition, Novel Foods & Food Allergens (NDA), *Guidance on the Scientific Requirements for an Application for Authorisation of a Novel Food in the Context of Regulation (EU) 2015/2283*, 22 EFSA J. e8961, at 12–18, 20–33 (2024) [hereinafter EFSA, *Novel Food Guidance*].

136. Novel Food Regulation, *supra* note 21, art. 11(2)(b).

137. Novel Food Regulation, *supra* note 21, arts. 10(2)(e), 7(a).

138. Novel Food Regulation, *supra* note 21, art. 11; *see also* Regulation 178/2002, of the European Parliament and of the Council of 28 January 2002 Laying Down the General Principles and Requirements of Food Law, Establishing the European Food Safety Authority and Laying Down Procedures in Matters of Food Safety, art. 6, 2002 O.J. (L 31) 1 [hereinafter Regulation 178/2002].

139. Novel Food Regulation, *supra* note 21, arts. 12(1), 10(6).

140. Novel Food Regulation, *supra* note 21, art. 12(1); Commission Implementing Regulation 2017/2470 of 20 December 2017, Establishing the Union List of Novel Foods, 2017 O.J. (L 351) 72 [hereinafter Regulation 2017/2470].

141. Novel Food Regulation, *supra* note 21, arts. 6(2), 9(3); *see, e.g.*, Commission Implementing Regulation (EU) 2021/882 of 1 June 2021 Authorising the Placing on the Market of Dried Tenebrio molitor Larva as a Novel Food, 2021 O.J. (L 194) 16 (authorizing a specifically defined product and set of conditions of use rather than a category).

applicant has obtained data protection, no one else may place that novel food on the market for five years.[142]

As of early 2026, the pipeline of cultivated meat applications in the European Union remains thin. The French company Gourmey submitted an application for cultivated foie gras on July 26, 2024,[143] representing the first cultivated meat application ever filed in the European Union.[144] On January 22, 2025, the Dutch company Mosa Meat, a pioneering entity in the field of cell-cultivated beef, submitted an application for cultivated beef fat.[145] These are the only two applications on file. Neither has received EFSA's scientific opinion, let alone Commission authorization. No cell-cultivated meat product has been authorized for sale anywhere within the European Union.[146]

The contrast is pronounced. Singapore's Food Agency approved Eat Just's cultivated chicken (marketed as GOOD Meat) for commercial sale in December 2020, well before the submission of the first cultivated meat application in the European Union.[147] In February 2023, Australia and New Zealand, operating under their joint food standards system administered by Food Standards Australia New Zealand (FSANZ), received an application for cultivated quail meat from Vow Group Pty Ltd.[148] FSANZ approved the application in March 2025, and the amendments to the Code were gazetted in June, making Australia and New Zealand among the first jurisdictions to

142. *See* Novel Food Regulation, *supra* note 21, arts. 6(2), 12(1), 26(1), 27(1)(d).

143. *See* Press Release, Gourmey, *Gourmey Seeks Approval in Five Key Markets, Confirming Global Ambitions* (July 26, 2024), https://gourmey.com/blogs/seeks-approval-in-five-key-markets-confirming-global-ambitions [https://perma.cc/48TF-8DQS].

144. *See First-Ever Regulatory Submission Made for Cultivated Meat in the EU*, GOOD FOOD INST. EUR. (July 26, 2024), https://gfieurope.org/blog/first-ever-regulatory-submission-made-for-cultivated-meat-in-the-eu/ [https://perma.cc/NH8V-2528].

145. *See Submitting Our First EU Market Authorisation Request*, *supra* note 22.

146. *See Food and Feed Information Portal*, EUR. COMM'N, https://ec.europa.eu/food/food-feed-portal/screen/home [https://perma.cc/ZF7P-AYE8] (last visited July 29, 2026); *OpenEFSA*, EUR. FOOD SAFETY AUTH., https://open.efsa.europa.eu/ [https://perma.cc/5QYD-CSZE] (last visited July 29, 2026).

147. *See* Aradhana Aravindan & John Geddie, *Singapore Approves Sale of Lab-Grown Meat in World First*, REUTERS (Dec. 2, 2020), https://www.reuters.com/business/environment/singapore-approves-sale-lab-grown-meat-world-first-2020-12-02/ [https://perma.cc/MGV3-XQGW]; *First-Ever Regulatory Submission*, *supra* note 144.

148. *See* FOOD STANDARDS AUSTL. N.Z., APPROVAL REPORT – A1269, CULTURED QUAIL AS A NOVEL FOOD (Apr. 7, 2025) [hereinafter A1269 APPROVAL REPORT], at 2, https://www.foodstandards.gov.au/sites/default/files/2025-04/A1269%20Approval%20report.pdf [https://perma.cc/G6MU-UGGS].

authorize the sale of cell-cultivated meat.[149] The regulatory pathway itself, rather than any explicit prohibition, is the identified barrier.

Several structural features of the European Union framework contribute to this delay.[150] First, the product-specific nature of authorization means that an authorization does not carry over to another company's product.[151] Even if Gourmey's cultivated foie gras is eventually authorized, that authorization would not benefit Mosa Meat's cultivated beef fat application or any other company's product. Each application must independently satisfy the evidentiary requirements.[152] Where the first applicant has obtained data protection, the later one may not even rely on its proprietary evidence.[153] This design feature ensures rigor but also increases the regulatory burden for an industry that, by its very nature, produces a variety of products from different species and cell lines. Second, the evidentiary requirements are substantial. An applicant must provide compositional analyses, toxicological studies (including both *in vitro* and *in vivo* assessments where relevant), nutritional data, allergenicity assessments, and detailed descriptions of the production process.[154] For an early-stage cultivated meat company operating with limited resources, assembling this dossier represents a significant financial and temporal investment.[155] Third, the political environment within the European Union may influence the pace of the regulatory process, even if it does not formally alter the scientific assessment. The assessment rests with a body that is independent in its scientific function, and the Commission may sit in its deliberations but may not seek to influence them.[156] The decision to authorize, which follows the opinion, is another matter. It is taken by the Commission through an implementing act,[157] and Commission officials are not immune to the currents of public and member-state opinion on cultivated meat. The European Union's Novel Food framework is designed to ensure that only

149. *Id*. at 2, 7; Food Standards Gazette No. FSC 179 (Austl.), Amendment No. 239 (June 18, 2025), https://www.foodstandards.gov.au/sites/default/files/2025-06/Amendment%20No.%20239.pdf [https://perma.cc/869E-RLAF].

150. *See* Tilman Reinhardt et al., *Cultivated Foie Gras Flies into Europe – Prepare for Legal Disruption*, EUR. L. BLOG (Sep. 5, 2024), https://www.europeanlawblog.eu/pub/ys66nyqh [https://perma.cc/5V9Z-3PG4].

151. *See* Novel Food Regulation, *supra* note 21, arts. 6(2), 26(1).

152. *See* Novel Food Regulation, *supra* note 21, arts. 6(2), 12(1); *see also* Regulation 2017/2470, *supra* note 140.

153. *See* Novel Food Regulation, *supra* note 21, arts. 26(1), 27(1)(d).

154. *See* Novel Food Regulation, *supra* note 21, art. 10(2); Regulation 2017/2469, *supra* note 134, arts. 3–5; EFSA, *Novel Food Guidance*, *supra* note 135, §§ 2, 3, 8, 9, 10.

155. *Cf.* EFSA, *Novel Food Guidance*, *supra* note 135, at 25–33 (detailing the toxicological, nutritional, and allergenicity data required of applicants).

156. *See* Regulation 178/2002, *supra* note 138, arts. 6(2), 28(8), 37(1)–(2).

157. *See* Novel Food Regulation, *supra* note 21, art. 12(1).

rigorously assessed products reach European consumers, and it fulfills that objective. The procedural demands of the framework nonetheless delay market access by years relative to jurisdictions that have adopted more flexible approaches.[158]

Rather than challenging these constraints, the Netherlands has sought a pragmatic workaround. In July 2023, Dutch regulators, cultivated meat producers, and industry representatives reached an agreement on a Code of Practice for Safely Conducting Tastings of Cultivated Foods Prior to European Union Approval.[159] This agreement facilitates the regulated tasting of cultivated meat and seafood in research settings.[160] The Code acknowledges the regulatory bottleneck while operating within the formal constraints of the Novel Food framework. The point is telling. One of the European Union's leading innovators[161] found it necessary to build a mechanism outside the regulatory framework so that people could taste a product that framework does not permit to be sold.[162]

B. Italy's Prohibition and the Internal European Union Tension

Italy has gone substantially beyond the European Union's precautionary approach. On December 1, 2023, the Italian Parliament enacted Law No. 172, which prohibits the production and sale of cell-cultivated food products derived from vertebrate animals within Italian territory.[163] Separately, the statute prohibits the use of names, labels, or commercial references that evoke food products of animal origin, such as "meat," "steak," or "salami," for processed products containing exclusively plant-based proteins.[164] Penalties for violations range from 10,000 to 150,000 euros, with additional sanctions including confiscation of products, exclusion from public subsidies, and closure of production facilities.[165]

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158. *See* Novel Food Regulation, *supra* note 21, arts. 11(1), 12(1), 22.

159. *See* Code of Practice for Safely Conducting Tastings of Cultivated Foods Prior to EU Approval (Neth. July 1, 2023) [hereinafter Neth. Code of Practice]; *see also* Emma Stok et al., *Code of Practice Introduced for Holding Cultivated Meat Tastings*, BIRD & BIRD (July 12, 2023), https://biotalk.twobirds.com/post/102j0mb/code-of-practice-introduced-for-holding-cultivated-meat-tastings [https://perma.cc/9Z3M-KMD7].

160. Neth. Code of Practice, *supra* note 159, § 8.

161. *Cf. European Innovation Scoreboard 2026, EUR. COMM'N* (July 9, 2026), https://projects.research-and-innovation.ec.europa.eu/en/statistics/performance-indicators/european-innovation-scoreboard/eis#/eis [https://perma.cc/C6RV-6T24] (ranking the Netherlands among the Union's innovation leaders).

162. *See* Neth. Code of Practice, *supra* note 159, § 1.

163. *See* Legge n. 172/2023, *supra* note 24, art. 2.

164. Legge n. 172/2023, *supra* note 24, art. 3.

165. Legge n. 172/2023, *supra* note 24, art. 5.

The political framing of the Italian ban is explicitly cultural. Proponents presented it as a defense of Italian gastronomic heritage, traditional agriculture, and the Mediterranean diet[166] against what they characterized as "synthetic food."[167] They furthermore depicted this latter category as being fundamentally irreconcilable with Italian food culture and values.[168] The statute names the object of protection in its own terms, describing the national agri-food heritage as an expression of Italy's socio-economic and cultural evolution and as of strategic relevance to the national interest.[169] The prohibition on meat denominations is justified in the same register, by reference to the cultural, socio-economic and environmental value of the national livestock heritage.[170] The framing carried the day in Parliament, where the Chamber of Deputies passed the bill by 159 votes to 53, with centrist lawmakers among those opposed.[171] Procedurally, Italy's enactment of the ban has also attracted scrutiny because the law was adopted before the expiry of the standstill period required under the European Union's Technical Regulations Information System (TRIS) notification procedure.[172] The defect matters in practice, since a technical regulation adopted in breach of the notification procedure may not be enforced against individuals.[173]

The Italian ban creates a tension within the European Union's legal architecture that has not yet been tested, but that appears structurally unavoidable. The Novel Food Regulation is an EU-level instrument. When a novel food is authorized and added to the Union List, it may be lawfully

166. Legge n. 172/2023, *supra* note 24, art. 3, para. 1.

167. *See* Paul Kirby, *Italy Bans Lab-Grown Meat in Nod to Farmers*, BBC NEWS (Nov. 17, 2023), https://www.bbc.com/news/world-europe-67448116 [https://perma.cc/RJF9-3DSA] (quoting the Minister of Agriculture describing Italy as the first country safe from the social and economic risks of synthetic food).

168. *See id.* (quoting the Minister on "maintaining the relationship between food, land and human [labor]").

169. *See* Legge n. 172/2023, *supra* note 24, art. 1, para. 1.

170. *See* Legge n. 172/2023, *supra* note 24, art. 3, para. 1.

171. *See* Angelo Amante, *Italy's Parliament Approves Ban on Lab-Grown Food Amid Tensions*, REUTERS (Nov. 16, 2023), https://www.reuters.com/markets/commodities/italys-parliament-approves-ban-lab-grown-food-amid-tensions-2023-11-16/ [https://perma.cc/688F-P8S6].

172. *See* Directive 2015/1535 of the European Parliament and of the Council of 9 September 2015 Laying Down a Procedure for the Provision of Information in the Field of Technical Regulations and of Rules on Information Society Services, arts. 5, 6, 2015 O.J. (L 241) 1; *see also Italy Bans Lab-Grown Meat, Violating EU Procedure*, OSBORNE CLARKE (May 3, 2024), https://www.osborneclarke.com/insights/italy-bans-lab-grown-meat-violating-eu-procedure [https://perma.cc/5DLF-K2DB].

173. *See* Case C-443/98, Unilever Italia SpA v. Central Food SpA, 2000 E.C.R. I-7565, ¶ 43–44, 49 (Sep. 26, 2000); Case C-194/94, CIA Security Int'l SA v. Signalson SA, 1996 E.C.R. I-2230, ¶ 54–55 (Apr. 30, 1996).

marketed throughout the entire European Union.[174] The free movement of goods, guaranteed by Articles 34 through 36 of the Treaty on the Functioning of the European Union (TFEU), prohibits quantitative restrictions on imports between member states and measures having an equivalent effect.[175] If and when the European Commission authorizes a cultivated meat product, whether it is Gourmey's cultivated foie gras, Mosa Meat's cultivated beef fat, or a future application, Italy's national prohibition would appear to conflict directly with the free movement principle. The question would then become whether Italy can invoke the derogations available under Article 36 of the TFEU, which permits restrictions justified on grounds of, *inter alia*, the protection of health and life of humans, to maintain its ban.[176] The ban rests on precaution rather than on assessment.[177] An authorization would follow a finding that the product poses no safety risk under its proposed conditions of use,[178] and the Italian justification would in consequence face significant legal obstacles.

The parallel to the American situation discussed in Part I is instructive. In both the United States and the European Union, subnational entities, i.e., states in the American federal system, member states in the European Union, are asserting the right to prohibit products that have been approved under the applicable federal or supranational regulatory framework.[179] In both systems, the constitutional or treaty-based framework appears to favor the federal or supranational authority.[180] In both systems, the political forces driving the subnational prohibitions are sufficiently powerful that the formal legal hierarchy may not prove dispositive.[181]

However, the analogy also has limits. In the United States, the federal-state conflict is adjudicated by an independent judiciary with an established preemption doctrine and a long history of resolving federalism disputes.[182] Within the European Union, the enforcement of free movement principles against restrictive measures enacted by member states falls within the remit

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174. *See* Novel Food Regulation, *supra* note 21, art. 6(2).

175. *See* Consolidated Version of the Treaty on the Functioning of the European Union arts. 34–36, Oct. 26, 2012, 2012 O.J. (C 326) 47 [hereinafter TFEU].

176. *See id*., at art. 36.

177. L *See* egge n. 172/2023, *supra* note 24, art. 2, para. 1; *cf.* Regulation 178/2002, *supra* note 138, arts. 6, 7.

178. *See* Novel Food Regulation, *supra* note 21, arts. 7(a), 11, 12(1).

179. *See supra* Part I (state prohibitions of federally cleared cultivated meat); *supra* Part II (Italy's prohibition of an EU-regulated product).

180. *See* U.S. CONST. art. VI, cl. 2; Novel Food Regulation, *supra* note 21, art. 6(2); TFEU, *supra* note 175, arts. 34, 36.

181. *See supra* Part I.B (political economy of state bans and cultural framing of Italy's prohibition).

182. *See supra* Part I.B (political economy of state bans).

of the European Court of Justice.[183] The litigation process differs from that observed in domestic contexts, typically involving infringement proceedings instigated by the European Commission, an entity that exercises discretion in determining which infringement proceedings to initiate.[184] Whether the Commission would bring an action against Italy over its cultivated meat ban, given the political sensitivity of the issue and the possibility that other member states harbor similar sentiments, is far from certain. Indeed, a joint note submitted by Italy, France, and Austria, with support from ten additional member states, to the Council of the European Union in January 2024 urged a comprehensive review of the legislative framework governing cultivated food.[185] The political dynamics within the Council may complicate both Commission enforcement and any legislative response at the European Union level.

In sum, the Italian ban, like the American state bans, reflects political and cultural commitments that may prove resistant to legal challenge even where the legal arguments for challenge are strong. In this sense, the cultivated meat case reveals a recurring feature of multi-level governance systems: formal legal hierarchies, whether constitutional (in the U.S.) or treaty-based (in the EU), provide the framework for resolving regulatory conflicts, but they do not always determine outcomes when subnational entities are motivated by deeply held cultural and economic interests.

C. Precaution as Structural Delay

These internal tensions notwithstanding, the European Union's approach occupies a distinct position on the regulatory spectrum. It is neither the open innovation pathway of the American federal model[186] nor the outright prohibition of the Italian or American state models.[187] The Novel Food Regulation does not prohibit cultivated meat. It establishes a pathway to market, a demanding, rigorous, scientifically grounded pathway, but a

183. *See* TFEU, *supra* note 175, arts. 258–260, 267.

184. *See Italy Bans Lab-Grown Meat*, *supra* note 172; *Is Italy's Cultivated Meat Ban Unenforceable?*, GFI EUR. (Feb. 1, 2024), https://gfieurope.org/blog/is-italys-cultivated-meat-ban-unenforceable-european-commission-ends-tris-review-as-law-did-not-comply-with-procedures-rules/ [https://perma.cc/6LT3-K282].

185. *See* Austrian, French, and Italian Delegations to the Council of the European Union, *The CAP's Role on Safeguarding High-Quality and Primary Farm-Based Food Production*, Council Doc. 5469/1/24 REV 1 (Jan. 22, 2024), https://data.consilium.europa.eu/doc/document/ST-5469-2024-REV-1/en/pdf [https://perma.cc/8S9A-W4EV].

186. *See supra* Part I.A.

187. *See supra* Parts I.B, II.B.

pathway nonetheless.[188] The European Union's position is that novel foods must be proven safe before they may be sold, and that the burden of proof falls on the applicant.[189] This is a legitimate regulatory philosophy, and it has the virtue of consistency: the same framework applies to cultivated meat, novel food ingredients, and any other food product without a significant history of consumption in the European Union.

The comparison with Singapore throws the European Union's approach into the sharpest relief. The Singapore Food Agency (SFA) approved GOOD Meat's cultivated chicken for commercial sale in December 2020, under a framework that requires rigorous safety evaluation but estimates nine to twelve months for an assessment once a complete dossier is received.[190] Singapore's assessment was not cursory: it required detailed safety data, production process documentation, and expert review.[191] But the SFA's institutional design prioritized regulatory efficiency alongside scientific rigor, reflecting a city-state's strategic interest in positioning itself as a hub for food technology innovation.[192] The contrast with the European Union is instructive: Singapore demonstrated that thorough safety assessment and timely market access are not mutually exclusive. The European Union's longer timeline reflects not a higher standard of scientific rigor but a more complex institutional process, involving multiple levels of governance, multiple reviewing bodies, and a decision-making chain that extends from applicant to EFSA to Commission to Council.[193]

The practical consequences of the European Union's philosophy, however, are significant. The authorization attaches to the novel food rather than to the applicant, so that each cultivated product requires its own entry on the Union list, though a successful applicant may obtain five years of data

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188. *See supra* notes 131–140 and accompanying text; Novel Food Regulation, *supra* note 21, art. 6(2).

189. *See* Novel Food Regulation, *supra* note 21, art. 10.

190. *See Requirements for the Safety Assessment of Novel Foods and Novel Food Ingredients*, SING. FOOD AGENCY (updated Mar. 17, 2025) [hereinafter SFA, *Novel Food Requirements*], https://www.sfa.gov.sg/docs/default-source/regulatory-standards-frameworks-and-guidelines/requirements-for-the-safety-assessment-of-novel-foods-and-novel-food-ingredients_17032025.pdf [https://perma.cc/JM7D-LZ8W]; Food Regulations (Cap. 283, Rg. 1) (Sing.).

191. *See* SFA, *Novel Food Requirements*, *supra* note 190, §§ 5.6, 8.5–8.8; *Overview of Pre-Market Approval Framework for Novel Food*, SING. FOOD AGENCY, https://www.sfa.gov.sg/regulatory-standards-frameworks-guidelines/novel-food-framework/overview-of-pre-market-approval-framework-for-novel-food [https://perma.cc/U9ND-VL49] (last visited Sep. 17, 2026).

192. *Cf. Our Targets*, SING. GREEN PLAN 2030, https://www.greenplan.gov.sg/targets/ [https://perma.cc/6DMF-CCC8] (last updated Mar. 31, 2026) (setting a national target for locally produced food).

193. *See* Novel Food Regulation, *supra* note 21, arts. 10–12.

protection, during which only that applicant may place the novel food on the market.[194] There is no generic authorization for "cultivated chicken" or "cultivated beef" as a category. The evidentiary requirements are substantial, requiring toxicological and nutritional data that may be costly and time-consuming for early-stage companies to generate.[195] The assessment timeline, even in the best case, is measured in years rather than months.[196] Moreover, the political environment within the European Union, which is exemplified by Italy's prohibition and by broader cultural skepticism toward "lab-grown" food in several member states,[197] may influence the Commission's willingness to act expeditiously even after EFSA has issued a positive opinion.

The competitive implications are real. Companies that develop cultivated meat products have limited resources and must choose where to seek initial market access. The European Union's lengthy and costly authorization process creates a powerful incentive for companies to prioritize market entry in the United States, Singapore, or other jurisdictions that offer faster pathways. The European Union thus risks finding itself at the end of the queue for cultivated meat commercialization, not because its consumers are uninterested or its market is unimportant, but because its regulatory pathway imposes costs and delays that make other markets more attractive for first-mover entry. This competitive dynamic, in which a precautionary regulatory framework inadvertently disadvantages the jurisdiction that adopted it, is familiar from other domains of European Union technology regulation and is a structural feature of the precautionary principle as applied to emerging technologies, a dynamic that Part IV situates within the broader innovation-safety equilibrium across jurisdictions.

The European Union's approach thus functions as a structural delay mechanism. It does not prohibit cultivated meat, but it ensures that cultivated meat will reach European consumers years after it reaches consumers in the United States, Singapore, and potentially other jurisdictions. Whether this delay is a feature (protecting European consumers from insufficiently assessed risks) or a bug (depriving European consumers of access to a safe and potentially beneficial food product) depends on one's assessment of the precautionary principle itself. What is clear is that the European Union's approach reflects a fundamentally different regulatory philosophy from the American federal framework, and that this philosophical difference has

194. *See supra* notes 131–140 and accompanying text; Novel Food Regulation, *supra* note 21, arts. 6(2), 12(1), 26(1), 27(1)(d).

195. *See* EFSA, *Novel Food Guidance*, *supra* note 135.

196. *See* Novel Food Regulation, *supra* note 21, arts. 11–12.

197. *See supra* Part II.

material consequences for the pace and geography of cultivated meat commercialization.

III. CHINA: STANDARDS BEFORE MARKETS

China has adopted an approach that defies simple characterization as either permissive or restrictive. The state is building a comprehensive regulatory infrastructure before granting commercial market access, a sequencing strategy that reflects a broader logic of state-directed technology governance with no precise analog in the American or European systems. This Part examines that sequencing in four steps. It moves from the strategic designation of the technology to the regulatory pathway it will take, then to the four features that set the Chinese approach apart, and finally to the choice of terminology the state has made for the product.

A. The Strategic Positioning

China's approach to cell-cultivated meat regulation cannot be understood in isolation from the Chinese state's broader strategy for technological governance. National planning documents name novel food technologies, direct research toward them, and set the terms on which they will be developed.[198] The key policy signal came in December 2021, when the Ministry of Agriculture and Rural Affairs listed cell-cultivated meat among the frontier technologies to be developed under the heading of future food manufacturing.[199] That was a statement of strategic intent rather than a regulatory measure. It signaled to researchers, to industry, and to the regulatory apparatus that the central government had placed cell-cultivated protein among the technologies it would support. In December 2022, Yan Song, Director of Division III Risk Assessment at CFSA, stated that "China will focus more on the food safety assessment of cell-cultivated meat in 2023," and indicated that expert working groups would be established to advance both innovation and food safety.[200] CFSA took the question of

198. *See* "Shisiwu" Quanguo Nongye Nongcun Keji Fazhan Guihua ("十四五"全国农业农村科技发展规划) [14th Five-Year Plan for National Agricultural and Rural Science and Technology Development], ZHONGHUA RENMIN GONGHEGUO NONGYE NONGCUNBU (中華人民共和國農業農村部) [MINISTRY OF AGRIC. & RURAL AFFS.] 26 (Dec. 28, 2021) [hereinafter 14th Five-Year Agricultural Science Plan], https://www.gov.cn/zhengce/zhengceku/2022-01/07/content_5666862.htm [https://perma.cc/5LYZ-EJXL] (China); 14TH FIVE-YEAR BIO-ECONOMY PLAN, *supra* note 25, at 14.

199. *See* 14th Five-Year Agricultural Science Plan, *supra* note 198, at 26.

200. Rachael Oatman, *US, China Strategize over Cultivated Meat Regulatory Approval*, MEAT+POULTRY (Jan. 5, 2023), https://www.meatpoultry.com/articles/27831-us-china-strategize-over-cultivated-meat-regulatory-approval [https://perma.cc/ZN2F-JMGX]; *see also Zhongmei Zhuanjia Xianshang Lianxian, Tantao Xibao Peiyang Rou de Jianguan Shenpi Lujing* (中美专家线上连线，探讨细胞培养肉的监管审批路径) [U.S.-China Experts

assessment into the Codex process in March 2025.[201] No domestic guidelines for the assessment of cultivated meat itself have been publicly released as of September 2026.[202]

The industry, meanwhile, has moved quickly. In 2019, a research team led by Professor Zhou Guanghong at Nanjing Agricultural University produced China's first piece of cell-cultivated pork.[203] The technology was commercialized through Joes Future Food (周子未来), a spinoff company established in late 2019, which achieved pilot-scale production in a five-hundred-liter bioreactor in 2023.[204] In late 2025, Joes Future Food completed construction of what is described as China's largest cell-cultivated meat production facility, featuring a two-thousand-liter bioreactor with an estimated annual production capacity of ten to fifty tons.[205] The facility is designed not primarily as a commercial production plant but as an engineering proving ground, to generate the technical and regulatory data needed to design future facilities at the ten-thousand-ton scale.

Connect Online to Discuss Regulatory Approval Pathways for Cell-Cultivated Meat], KECHIXU SHIPIN XINWEN (可持续食品新闻) [SUSTAINABLE FOOD NEWS], https://foodsustainability.cn/?p=10544 [https://perma.cc/MJS9-FY3X] (last visited Sep. 12, 2026).

201. *See Di 55 Jie Guoji Shipin Tianjiaji Fadian Weiyuanhui zai Hanguo Shou'er Zhaokai* (第55届国际食品添加剂法典委员会在韩国首尔召开) [The 55th Session of the Codex Committee on Food Additives Convened in Seoul], GUOJIA SHIPIN ANQUAN FENGXIAN PINGGU ZHONGXIN (国家食品安全风险评估中心) [CHINA NAT'L CTR. FOR FOOD SAFETY RISK ASSESSMENT] (Mar. 31, 2025) [hereinafter CFSA, 55th CCFA Session], https://cfsa.net.cn:8899/site2/wap/zxdt/gzdt/2025/14943.shtml [https://perma.cc/Q6A6-7769].

202. *See* Searches of the China National Center for Food Safety Risk Assessment, https://www.cfsa.net.cn/ (on file with the *Fordham Urban Law Journal*) (last visited Sep. 1, 2026), and of the new food raw material announcements published by the National Health Commission, https://www.nhc.gov.cn [https://perma.cc/W48U-FZKS] (last visited Sep. 1, 2026), using the terms 细胞培养肉 (cell-cultivated meat), 培**养肉** (cultivated meat), and 新食品原料 (new food raw material), disclose no guidelines specific to the assessment of cell-cultivated meat. *See, e.g.*, *Sanghuang Junsiti Deng 3 Zhong Xin Shipin Yuanliao Gongkai Zhengqiu Yijian* [Public Consultation on Three New Food Raw Materials Including Sanghuangporus Mycelium], GUOJIA SHIPIN ANQUAN FENGXIAN PINGGU ZHONGXIN [CHINA NAT'L CTR. FOR FOOD SAFETY RISK ASSESSMENT] (Aug. 31, 2026), https://www.cfsa.net.cn/spaqbz/xzxkzqyj/2026/17223.shtml (on file with the *Fordham Urban Law Journal*) (a representative consultation from the same period, concerning unrelated substances).

203. *See Chinese Scientists Develop Lab-Grown Meat from Animal Cells*, XINHUA (Nov. 22, 2019), http://www.xinhuanet.com/english/2019-11/22/c_138574763.htm [https://perma.cc/6DJU-F6TU].

204. *See* JOES FUTURE FOOD, *supra* note 26; *see also* Mridul, *supra* note 27.

205. *See Zhouzi Weilai Jiancheng Guonei Zuida Xibao Peiyang Rou Zhongshi Gongchang* (周子未来建成国内最大细胞培养肉中试工厂) [Joes Future Food Completes Construction of China's Largest Cell-Cultivated Meat Pilot Plant], FOODTALKS (Dec. 15, 2025), https://www.foodtalks.cn/news/60481 [https://perma.cc/NB2J-8Q58]; Mridul, *supra* note 27.

The critical feature of China's trajectory is the sequencing. The industrial infrastructure is being built in advance of regulatory approval. Companies are developing production capacity, generating safety data, and refining manufacturing processes.[206] However, no application for a cultivated meat product appeared in the National Health Commission's public record of accepted submissions as of July 2026, and no such product appeared among the new food raw materials it has announced.[207] This sequencing is the reverse of the American experience.[208] In the United States, UPSIDE Foods submitted its product for FDA consultation under a framework the two agencies had settled three years earlier, and the industry entered the market as soon as it cleared.[209] In China, the state is applying the terminology and the assessment framework while industry builds production capacity.[210] When the state opens the market on a timetable of its own choosing, both the regulatory and the industrial apparatus will be in place.

The strategic significance of this sequencing should not be underestimated. By building production capacity before regulatory approval, a sequence not peculiar to this sector, Chinese companies will be positioned to scale rapidly once approval is granted.[211] In contrast, their

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206. *See* Li Chen, *2026 Guoji Xibao Peiyangrou Chanye Luntan Zai Nanjing Juxing* (2026 国际细胞培养肉产业论坛在南京举行) [2026 International Cell-Cultured Meat Industry Forum Held in Nanjing], ZHONGGUO KEXUE BAO [CHINA SCI. DAILY] (Apr. 26, 2026), https://news.sciencenet.cn/htmlnews/2026/4/563735.shtm [https://perma.cc/5F8P-GQVQ] (reporting that Chinese companies have achieved pilot-scale production in 2000-liter bioreactors ahead of regulatory approval).

207. *See Xin Shipin Yuanliao Shenqing Shouli Gongshi* (新食品原料申请受理公示) [*Public Notice of Accepted Applications for New Food Raw Materials*], GUOJIA WEISHENG JIANKANG WEIYUANHUI (国家卫生健康委员会) [NAT'L HEALTH COMM'N] [hereinafter NHC, *Acceptance Notices*], https://zwfw.nhc.gov.cn/kzx/slgs/xspylsp/ [https://perma.cc/39SV-K5KD] (last visited July 26, 2026) (a review of the accepted applications listed there discloses no cell-cultivated meat product); *see Xin Shipin Yuanliao Anquanxing Shencha Guanli Banfa* (新食品原料安全性审查管理办法) [Administrative Measures for the Safety Review of New Food Raw Materials] (promulgated by the Nat'l Health & Family Plan. Comm'n, Order No. 1, May 31, 2013, effective Oct. 1, 2013, amended by Order No. 18, Dec. 26, 2017) [hereinafter New Food Raw Materials Measures], arts. 4, 6, https://www.nhc.gov.cn/wjw/c100221/202201/0bbea384f540430485b886edba385559.shtml [https://perma.cc/5AB9-MECQ] (China) (establishing the acceptance and publication procedure).

208. *Cf. supra* Part I.A.

209. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 5; *Pre-Market Inventory*, FDA, *supra* note 69; *Human Food Made with Cultured Animal Cells*, *supra* note 39.

210. *See* Rou yu Rou Zhipin Shuyu (肉与肉制品术语) [Vocabulary for Meat and Meat Products], GB/T 19480-2025, § 3.1.10 (China); New Food Raw Materials Measures, *supra* note 207, art. 4.

211. *Cf.* Xin Nengyuan Qiche Shengchan Qiye ji Chanpin Zhunru Guanli Guiding (新能源汽车生产企业及产品准入管理规定) [Provisions on the Administration of Access of New Energy Vehicle Manufacturers and Products] (promulgated by the Ministry of Indus. & Info. Tech., Order No. 39, Jan. 6, 2017, effective July 1, 2017, amended July 24, 2020),

American counterparts, which received regulatory clearance in 2023, continue to face the industry-wide hurdles of scaling production and reducing cost.[212] The state invests in manufacturing capacity and in standard-setting in parallel, so that when the market opens, domestic producers are ready to compete at scale.[213]

This sequencing strategy has an international dimension that is equally significant. By participating in bilateral discussions with the FDA and by monitoring regulatory developments in Singapore, the European Union, and Australia, China is building the knowledge base to design its regulatory framework with full awareness of international best practices, complemented by a keen awareness of global vulnerabilities. The Chinese framework, when it emerges, may incorporate elements drawn from multiple jurisdictions while reflecting distinctively Chinese institutional priorities. This selective borrowing, which is common in Chinese regulatory design across sectors, allows the state to benefit from the regulatory experimentation of other jurisdictions without being bound by their outcomes.[214]

B. The Regulatory Pathway: New Food Raw Material

The most probable regulatory pathway for cell-cultivated meat in China runs through the "new-food raw-material" (*xin shipin yuanliao* 新食品原料) approval process, administered by the National Health Commission ("NHC") under the Administrative Measures for the Safety Review of New Food Raw Materials.[215] The measures establish a pre-market approval system for food products and ingredients that have no traditional history of consumption in China.[216] An applicant submits a safety evaluation dossier

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https://www.miit.gov.cn/zcfg/jdcjxl/art/2020/art_7131370cef3e47b9af7b17c57a612436.html [https://perma.cc/W8AF-J8QZ] (China) (requiring access approval and product listing before sale).

212. *See* CRS REPORT, *supra* note 12, at 5 (identifying scaling up production as a primary commercialization hurdle, and noting concerns that bioreactors "may not be as effective when used for bulk cell growth").

213. *See, e.g.*, JONAS NAHM, COLLABORATIVE ADVANTAGE: FORGING GREEN INDUSTRIES IN THE NEW GLOBAL ECONOMY 112–50 (2021).

214. *See* Pitman B. Potter, *Legal Reform in China: Institutions, Culture, and Selective Adaptation*, 29 LAW & SOC. INQUIRY 465, 478, 483 (2004) (describing selective adaptation as a dynamic by which nonlocal institutional practices and organizational forms are mediated by local norms).

215. New Food Raw Materials Measures, *supra* note 207.

216. *Id.* arts. 2, 4, 5; Zhonghua Renmin Gongheguo Shipin Anquan Fa (中华人民共和国食品安全法) [Food Safety Law of the People's Republic of China] (promulgated by the Standing Comm. Nat'l People's Cong., Apr. 24, 2015, amended Dec. 29, 2018, Apr. 29, 2021 & Sep. 12, 2025, effective Dec. 1, 2025) [hereinafter Food Safety Law], arts. 37–38, STANDING COMM. NAT'L PEOPLE'S CONG. GAZ.,

to the NHC, which forwards it to the CFSA for technical review.[217] The CFSA evaluates the submission against established safety criteria and provides its assessment to the NHC, which issues the final approval or rejection.[218]

Cell-cultivated meat has no history of consumption in China. It is, by definition, a product that did not exist as human food until the last decade. It therefore clearly falls within the scope of the "new-food raw-material" regime. The question that remains unresolved is whether China will develop a specific regulatory pathway tailored to cell-cultivated meat, analogous to the FDA-USDA Formal Agreement in the United States, or will subsume cultivated meat within the existing "new-food raw-material" framework without bespoke modifications. The fact that the CFSA has established dedicated expert working groups for cultivated meat assessment suggests that some degree of tailoring is anticipated, but the form and extent of that tailoring have not yet been publicly clarified.[219]

A recent precedent may illuminate the trajectory. In September 2024, China published the Requirements for Safety Evaluation Dossiers of Genetically Modified Microorganisms for Food Processing (Trial), which is a set of technical guidelines that, for the first time, established a clear pathway for food ingredients produced using genetically modified microorganisms.[220] In July 2025, D-Allulose became the first "new-food raw-material" approved through a pathway involving genetically modified microorganisms.[221] The D-Allulose precedent is significant for two reasons. First, it demonstrates that the Chinese regulatory system is capable of creating new technical pathways for novel food technologies and processing applications through those pathways. Second, it suggests that the regulatory infrastructure is being incrementally expanded to accommodate

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https://policy.mofcom.gov.cn/claw/clawContent.shtml?id=104105 [https://perma.cc/9SU9-BACN] (China).

217. *See* New Food Raw Materials Measures, *supra* note 207, arts. 5–6.

218. *See* New Food Raw Materials Measures, *supra* note 207, arts. 15–16.

219. *See* Oatman, *supra* note 200 and accompanying text.

220. *See Shipin Jiagong Yong Yichuan Xiushi Weishengwu Anquanxing Pingjia Shenbao Cailiao Yaoqiu (Shixing)* (食品加工用遗传修饰微生物安全性评价申报材料要求（试行）) [Requirements for Safety Evaluation Application Materials for Genetically Modified Microorganisms Used in Food Processing (Trial)], GUOJIA SHIPIN ANQUAN FENGXIAN PINGGU ZHONGXIN (国家食品安全风险评估中心) [CHINA NAT'L CTR. FOR FOOD SAFETY RISK ASSESSMENT] (Sep. 13, 2024), https://www.cfsa.net.cn/zxdt/tzgg/2024/14077.shtml (on file with the *Fordham Urban Law Journal*) (China).

221. *See Guanyu D-Aluotang Deng 20 Zhong "Sanxin Shipin" De Gonggao* (关于D-阿洛酮糖等20种"三新食品"的公告) [*Announcement on D-Allulose and 19 Other "Three New Foods"*], GUOJIA WEISHENG JIANKANG WEIYUANHUI (國家衛生健康委員會) [NAT'L HEALTH COMM'N] (July 2, 2025), https://www.nhc.gov.cn/sps/c100088/202507/63194b55e9fd4a6daa74f59a06cfd792.shtml [https://perma.cc/HTC9-YUV2] (China).

technologies, including but not limited to cell-cultivated meat, that challenge traditional food production categories. The pace has quickened. The Commission accepted fifty-three applications for new food raw materials in 2025, an increase of seventy-seven percent over the previous year, and approved fifteen.[222] Additionally, the NHC approved twelve "new-food raw-materials," a figure comparable to the full-year total for the previous year.[223]

C. The Chinese Approach in Context

Taken together, four features distinguish China's approach, each reflecting a deeper logic of state-directed technology governance.

The first is the precedence of standards over markets. China is building the regulatory architecture, including technical standards and the terms of assessment, before any company has applied for commercial approval.[224] This is a deliberate strategy, not regulatory delay. The effect is that the terms on which cultivated meat enters the Chinese market are being settled before any commercial actor can establish facts on the ground. In the United States, by contrast, the framework was assembled out of statutes written for conventional meat and poultry, and the agencies settled their respective roles by agreement between themselves.[225] In the European Union, the framework existed but was designed for a broader category of novel foods, not specifically for cultivated meat.[226] China's approach is the most deliberate in its sequencing of the three. It reflects a state that is actively shaping the regulatory environment rather than reacting to commercial pressures.

The second is the integration of regulation with industrial policy. In the United States, food safety regulation and industrial policy are institutionally separate. The FDA and FSIS assess safety, and neither is charged with promoting or restraining an industry.[227] Whether cultivated meat succeeds or fails commercially is, from the federal regulatory perspective, a market

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222. *See 2025 Woguo Xin Shipin Yuanliao Pandian* (2025我国新食品原料盘点) [*Review of China's New Food Raw Materials in 2025*], Ruixu Jituan (瑞旭集团) [CIRS GRP.] (Jan. 14, 2026), https://www.cirs-group.com/cn/food/shen-pi-ti-su-d-e-luo-tong-tang-shou-huo-pi-xin-xing-dan-bai-chi-xu-huo-re [https://perma.cc/59TL-KFT5] (China).

223. *See Analysis of New Food Raw Material Applications in the First Half of 2025 in China*, CIRS GRP. (July 24, 2025), https://www.cirs-group.com/en/food/analysis-of-new-food-raw-material-applications-in-the-first-half-of-2025-in-china [https://perma.cc/JS5Z-FX39].

224. *See* GB/T 19480-2025, *supra* note 210, § 3.1.10; New Food Raw Materials Measures, *supra* note 207, art. 4; NHC, *Acceptance Notices*, *supra* note 207.

225. *See supra* Part I.A; FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 1–3; 21 U.S.C. §§ 601(j), 453(f).

226. *See supra* Part II.A; Novel Food Regulation, *supra* note 21, arts. 3(2)(a)(vi), 6(2).

227. *See supra* Part I.A; 21 U.S.C. §§ 601(j), 453(f).

outcome rather than a regulatory objective. In China, by contrast, this separation does not exist. The same state apparatus that sets food safety standards also sets research and development priorities.[228] The listing of cell-cultivated meat among the frontier technologies to be developed is a designation rather than a permission, and it directs research toward the technology well before any question of market entry arises.[229] Regulation is one instrument among several rather than the whole of the state's relation to the technology.[230]

The third is selective international engagement. China participated in bilateral discussions with the United States FDA on cultivated meat safety assessment in December 2022, which is a significant signal of willingness to engage with international regulatory developments.[231] However, this engagement has been strategic rather than harmonious. China has neither adopted nor aligned with the FDA's regulatory framework or with the European Union's Novel Food pathway. It is developing its own approach, informed by international developments but designed to serve Chinese strategic interests. This posture, engaged but autonomous, is consistent with China's approach to international regulatory cooperation, in which the state participates in multilateral discussions while maintaining sovereign control over domestic regulatory outcomes. For example, in March 2025 the CFSA joined the SFA in putting a proposal on the risk assessment of culture media components before the Codex Committee on Food Additives.[232] At the same session the Center tabled a proposal on that committee's future program of work.[233]

The fourth, and perhaps most theoretically significant, feature is what might be described as experimental regulation (*shiyan xing jianguan* 实验性监管).[234] China's approach to cultivated meat is not simply a matter of "delayed approval" or "cautious permissiveness." It represents a distinctive regulatory modality in which the state uses the promulgation of technical

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228. *See* 14th Five-Year Agricultural Science Plan, *supra* note 198, at 26; New Food Raw Materials Measures, *supra* note 207, arts. 5–6.

229. *See* 14th Five-Year Agricultural Science Plan, *supra* note 198, at 27.

230. *Cf.* BARRY NAUGHTON, THE RISE OF CHINA'S INDUSTRIAL POLICY, 1978 TO 2020, at 99–130 (Buena Onda & S.A. de C.V., eds., 2021) (on the range of instruments through which the Chinese state directs technological development).

231. *See U.S., Chinese Food Regulatory Officials Confer on Cultivated Meat Safety*, FOOD SAFETY MAG. (Jan. 5, 2023), https://www.food-safety.com/articles/8252-us-chinese-food-regulatory-officials-confer-on-cultivated-meat-safety [https://perma.cc/E623-R3Q2].

232. *See* CFSA, 55th CCFA Session, *supra* note 201.

233. *Id.*

234. *See, e.g.*, Sebastian Heilmann, *From Local Experiments to National Policy: The Origins of China's Distinctive Policy Process*, 59 CHINA J. 1, 10–18 (2008); Sebastian Heilmann, *Maximum Tinkering Under Uncertainty: Unorthodox Lessons from China*, 35 MOD. CHINA 450, 453–55 (2009); *see also* NAHM, *supra* note 213, at 6, 135.

standards as a mechanism for legitimating and shaping an emerging industry before that industry has received formal market authorization.[235] The logic is neither prohibition nor permission but endorsement-through-standardization. By fixing the terms of the product and the conditions of its assessment, the state signals to both industry and consumers that a technology is being incorporated into the regulatory order.[236] Recognition, in this sense, precedes permission. The state has not, however, granted final authorization to sell.[237]

This is a form of regulatory staging that has no precise analogue in either the American or European system. In the United States, the agencies read cell-cultivated products into statutes written for conventional meat and poultry, and the coordination they required was settled by an agreement between them rather than by legislation.[238] In the European Union, the framework exists in advance but as a general-purpose instrument (the Novel Food Regulation) that names cell culture among the categories it covers without providing anything specific to it.[239] In China, the state has begun with the terminology, fixing the standard terms before any product has been assessed.[240] The sequence is familiar in Chinese regulatory practice, where the state sets the terms on which a new technology may be tried before deciding the terms on which it may be sold.[241] The approval of D-Allulose in 2025 shows the process at work. It came through the standard route for new food raw materials, in a single announcement covering twenty items across three categories.[242] The comparison is nonetheless imperfect, since a

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235. *See* GB/T 19480-2025, *supra* note 210; NHC, *Acceptance Notices*, *supra* note 207.

236. *See* GB/T 19480-2025, *supra* note 210; New Food Raw Materials Measures, *supra* note 207, art. 4.

237. *See* NHC, *Acceptance Notices*, *supra* note 207; *see also Xin Shipin Yuanliao Shenpi Tongzhi Gonggao* (新食品原料审批通知公告) [*Notices and Announcements on New Food Raw Material Approvals*], GUOJIA WEISHENG JIANKANG WEIYUANHUI (国家卫生健康委员会) [NAT'L HEALTH COMM'N], https://zwfw.nhc.gov.cn/kzx/tzgg/xspylsp_225/ [https://perma.cc/7FH9-JGWX] (last visited Sep. 17, 2026) (a review of the announcements published there discloses no approval of a cell-cultivated meat product).

238. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 1–3; 21 U.S.C. §§ 601(j), 453(f).

239. *See* Novel Food Regulation, *supra* note 21, art. 3(2)(a)(vi).

240. *See* GB/T 19480-2025, *supra* note 210, § 3.1.10; New Food Raw Materials Measures, *supra* note 207, art. 4.

241. *See* Zhineng Wanglian Qiche Daolu Ceshi yu Shifan Yingyong Guanli Guifan (Shixing), 智能网联汽车道路测试与示范应用管理规范（试行) [Administrative Rules for Road Testing and Demonstration Application of Intelligent Connected Vehicles (Trial)], promulgated by the Ministry of Indus. & Info. Tech., the Ministry of Pub. Sec. & the Ministry of Transp., July 27, 2021, No. 97, https://www.gov.cn/zhengce/zhengceku/2021-08/03/content_5629199.htm [https://perma.cc/9WRS-VWSV] (China).

242. *See* Announcement on D-Allulose, *supra* note 221.

sweetener raises none of the definitional or agricultural questions that cultivated meat raises.

This understanding of China's approach has implications for comparative regulatory analysis. Chinese scholars have described the existing framework as not fully applicable to cell-cultured meat and have called for a dedicated one.[243] An outside observer might read this as "underdeveloped" or as evidence of regulatory lag. Such a characterization would misread the logic of the Chinese system. The absence of a commercial approval is not evidence of regulatory underdevelopment. It is evidence of a deliberately sequenced process in which standardization precedes commercialization and in which the state retains control over the timing and conditions of market entry.[244] The Chinese state does not reject private innovation. It encourages and strategically directs it. But it controls the conditions under which innovative products enter the market, defining the regulatory standards, the assessment procedures, and the timeline for commercial approval. Private actors develop the technology, while the state determines when and how the technology reaches consumers. This is governance through standard-setting and approval control rather than through prohibition. This approach differs fundamentally from both the American pluralist approach and the European precautionary framework. In addition, it enables the state to simultaneously promote technological development and maintain regulatory sovereignty over the food system.

D. The Terminological Choice

Beyond regulatory architecture, a distinct but consequential dimension of China's approach concerns terminology. The choice of terminology determines the product's classificatory position within the Chinese food standards system, its labeling requirements under the General Standard for the Labeling of Prepackaged Foods (GB 7718), and its path through the enforcement system administered by the State Administration for Market Regulation.[245] The national standard on meat terminology, revised in 2025,

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243. *See* Li Jiajie (李佳洁) & Peng Jiaxun (彭佳勋), *Xitongxing Fengxian Zhili Shiyu xia Xibao Peiyang Rou Shipin Anquan Jianguan Kuangjia Jiangou* (系统性风险治理视域下细胞培养肉食品安全监管框架建构) [*Construction of a Regulatory Framework for the Food Safety of Cultured Meat from the Perspective of Systemic Risk Governance*], 47 SHIPIN KEXUE (食品科学) [FOOD SCIENCE] 26, 31 (2026) (China).

244. *Cf.* Yi Lu, *Critical Thinking About the Precautionary Principle in China's Food Safety Law*, 11 FRONTIERS L. CHINA 692, 705–10 (2016).

245. *See* Yubaozhuang Shipin Biaoqian Tongze (预包装食品标签通则) [General Standard for the Labeling of Prepackaged Foods], GB 7718-2011, superseded by GB 7718-2025 (effective Mar. 16, 2027); *see also* David Ettinger & Jenny Li, *From the Year of the Rabbit to the Year of the Dragon: China's Food Law Year-in-Review 2023*, KELLER &

lists "*xibao peiyang rou*" (细胞培养肉) and "*xibao peiyu rou*" (细胞培育肉) as the standard terms, renders both as cultured meat, and defines the product as one obtained by culturing animal cells in vitro.[246] The former is already in use in national research planning and in media coverage.[247] Other expressions nonetheless remain current, and they carry different implications. "*Renzao rou*" (人造肉), literally "artificial meat" or "man-made meat," is also in circulation, and it does not distinguish cell-cultivated products from plant-based ones.[248] "*Shengwu peiyu rou*" (生物培育肉), literally "biologically cultivated meat," is likewise in use, emphasizing the biological continuity between cultivated and conventional meat and framing the product as a variant of meat rather than a substitute for it.[249]

The choice carries consequences well beyond semantics. Had the standard adopted "*renzao rou*," the product would have entered the Chinese market under a linguistic cloud of artificiality, with the attendant risks of depressed demand, more restrictive regulation, and difficulty in positioning the product alongside conventional meat at retail.[250] By selecting terms built on "rou," the standard instead places the product within the category of meat, a framing that eases both consumer acceptance and regulatory integration within frameworks designed for meat products.[251] In China's standard-setting system, the choice of terminology is effectively a regulatory act. The state that controls the name controls the market. This terminological question is one dimension of the broader struggle over definitional sovereignty that Part IV.B analyzes in comparative perspective.

IV. THREE DIMENSIONS OF REGULATORY DIVERGENCE

The preceding Parts have traced the regulatory trajectories of three jurisdictions in descriptive detail. This Part moves from description to structural analysis, identifying three cross-cutting dimensions along which the United States, the European Union, and China diverge in their

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HECKMAN LLP (Mar. 4, 2024), https://www.khlaw.com/insights/year-rabbit-year-dragon-chinas-food-law-year-review-2023 [https://perma.cc/E9X3-F77B].

246. GB/T 19480-2025, *supra* note 210, § 3.1.10.

247. *See* 14th Five-Year Agricultural Science Plan, *supra* note 198, at 2; Zhao Jiulong (赵久龙), *Xibao Peiyang Rou: Zai Shiyanshi Li "Zhong Rou"* (细胞培养肉：在实验室里"种肉") [*Cell-Cultivated Meat: "Growing Meat" in the Laboratory*], BANYUETAN (半月谈) [CHINA COMMENT] (JUNE 13, 2024), http://www.news.cn/tech/20240613/2768a8d80ead48c1abb7221797f761d8/c.html [https://perma.cc/YQP2-DJT9] (China).

248. Li & Peng, *supra* note 243, at 31.

249. Li & Peng, *supra* note 243, at 31.

250. Jingjing Liu et al., *Chinese Consumers' Attitudes and Potential Acceptance toward Artificial Meat*, 10 FOODS 353, at 21 (2021).

251. *See id.* at 23–24.

governance of cell-cultivated meat. The argument advanced here is that these dimensions reflect fundamentally different conceptions of the state's relationship to technological disruption in the food system. Table 1 summarizes the key regulatory parameters across the three jurisdictions, and the remainder of this Part analyzes the structural logics that produce these divergences.

Table 1. Three Regulatory Equilibria Compared[252]

Jurisdiction / *Dimension*	**United States**	**European Union**	**China**
Regulatory pathway	Dual-agency: • FDA pre-market consultation, and • USDA-FSIS inspection	Single gateway: • Novel Food Regulation (EU) 2015/2283	Anticipated: • New food raw material approval
Lead agency(ies)	FDA + USDA-FSIS	European Commission + EFSA	NHC + CFSA (anticipated)
First commercial sale	July 2023	None (first application: July 2024)	None (standards under development)
Innovation–safety equilibrium	Federal level: • Innovation-permissive	Precautionary	Strategic patience
Definitional sovereignty	• Federal: "meat"/"poultry"; • States: contested	• Novel food category; • Italy: ontological prohibition	Three competing terms: • Terminology unsettled
Internal resistance	7 state criminal bans	Italy Law No. 172 (national ban)	Not yet manifested
SPS vulnerability	**High** (state bans lack scientific basis)	**Moderate** (procedural compliance but structural delay)	**Low** (no restrictive measures enacted)

A. The Innovation-Safety Trade-off: Three Equilibria

Each of the three jurisdictions has arrived at a different equilibrium between the promotion of innovation and the assurance of safety, an equilibrium that reflects the jurisdiction's broader regulatory philosophy and institutional structure.

252. Source: Author's compilation based on the regulatory frameworks discussed *supra* Parts I–III.

The Innovation Model. The United States federal framework occupies the innovation-permissive end of the spectrum. The FDA-USDA approach treats cultivated meat as a food product to be evaluated under existing safety standards, not as a special category requiring exceptional regulatory treatment.[253] Safety is assured through process oversight, that is, pre-market consultations, facility inspections, and label approvals, rather than through prohibition or precautionary delay.[254] The regulatory message is accordingly clear, namely, that if the product is safe, it may be sold.

The advantages of this model are substantial. Products reached American consumers within four years of the joint framework's adoption,[255] and they did so without new legislation, because the existing statutes were read to cover them.[256] Firms could plan against known requirements from 2019 onward,[257] and the cost of compliance fell on demonstrating safety rather than on securing a new legal category. Accommodating a novel technology within existing law also spares the legislature the task of defining that technology before its commercial form is known, which is no small advantage where the science is moving faster than the drafting. The model treats regulatory silence as permission and reserves prohibition for demonstrated harm, an allocation that favors the entrant over the incumbent.

That same rapid market access, however, provoked the political backlash that now threatens the framework's coherence. The innovation-safety equilibrium at the federal level is being destabilized not by scientific evidence of risk but by state-level political action driven by agricultural protectionism and cultural resistance.[258] The American innovation-safety trade-off has thus metamorphosed into a federalism conflict, a contest between federal agencies that have made a regulatory judgment about safety and state legislatures that have made a political judgment about desirability.[259] The federal-state split on cultivated meat is, in this regard,

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253. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 1–2; 21 U.S.C. § 601(j) (defining "meat food product"), § 453(f) (defining "poultry product").

254. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 2–3 (assigning pre-market consultation and inspection of cell banks and culturing facilities to HHS-FDA and inspection, processing, and label preapproval to USDA-FSIS); 9 C.F.R. § 412.1 (2026).

255. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 5; *Pre-Market Inventory*, FDA, *supra* note 69; *Human Food Made with Cultured Animal Cells*, *supra* note 39.

256. *See* 21 U.S.C. §§ 601(j), 453(f); FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 1–2.

257. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 5.

258. *See* ALA. CODE § 20-1-161 (2024); FLA. STAT. § 500.452 (2025); IND. CODE § 15-17-5-6.1 (2025); MISS. CODE ANN. § 75-35-15 (2025); MONT. CODE ANN. §§ 50-31-501(6), 50-31-511 (2025); NEB. REV. STAT. § 81-2282 (2025); TEX. HEALTH & SAFETY CODE ANN. § 433.057 (West 2025) (stating that cell-cultured products could disrupt traditional livestock markets and that the measure would support traditional agriculture).

259. *See supra* Part I.

structurally analogous to other domains in which federal regulatory approval has coexisted with state-level resistance, most notably cannabis, where a growing number of states have legalized a product that remains a controlled substance under federal law.[260] Here, however, the cultivated meat case presents the reverse configuration, that is, federal approval accompanied by state prohibition. But in both cases, the underlying dynamic is the same. The American federal system generates regulatory contradictions that are ultimately resolvable only by the federal courts or by Congress.

The Assurance Model. The European Union, for its part, occupies the precautionary end of the spectrum. The Novel Food Regulation does not prohibit cultivated meat, but it imposes substantial *ex ante* evidentiary requirements that must be satisfied before any market access is granted.[261] The burden of proof falls entirely on the innovator, since it is the applicant's obligation to demonstrate safety to EFSA's satisfaction, not the regulator's obligation to demonstrate risk.[262]

Those requirements are not without return. A single authorization opens twenty-seven markets, and the applicant meets one evidentiary standard rather than twenty-seven.[263] In addition, the conditions for authorization are published in advance, so a firm knows before it invests what it will have to show.[264] The resulting assessment travels, and regulators elsewhere can read an EFSA opinion and draw on it, which is one reason the European framework has served as a reference point for jurisdictions building their own.[265] Rigor purchased at the cost of delay also purchases durability, because an authorization granted on a full assessment is harder to unsettle politically than one granted on a consultation. The American experience bears this out.[266]

That protection has a price. The framework shields European consumers from any product that has not been comprehensively assessed, but it also ensures that those consumers will not have access to cultivated meat products for years after consumers in other jurisdictions.[267] The precautionary approach also creates a competitive asymmetry. Companies that develop cultivated meat products face a longer and more expensive path to the

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260. *See* 21 C.F.R. § 1308.11(d)(23) (2026). *Cf.* Robert A. Mikos, *On the Limits of Supremacy: Medical Marijuana and the States' Overlooked Power to Legalize Federal Crime*, 62 VAND. L. REV. 1421, 1425–30 (2009).

261. *See* Novel Food Regulation, *supra* note 21, arts. 3(2)(a)(vi), 6(2), 7(a).

262. *See id.* arts. 10(2)(e), 11(2).

263. *See* Novel Food Regulation, *supra* note 21, art. 6(2).

264. *See id.* arts. 7, 10(2).

265. *See* A1269 APPROVAL REPORT, *supra* note 148, at 14, 47.

266. *See supra* Parts I.B–I.C.

267. *See* Novel Food Regulation, *supra* note 21, arts. 11(1), 12(1) (allowing nine months for the opinion and a further seven months for the implementing act).

European market than to the American or Singaporean market,[268] which may incentivize them to seek initial commercialization in more permissive jurisdictions and only subsequently invest in the European Union authorization process. The European Union's equilibrium is procedurally stable, the framework having been in force since 2018.[269] However, it is coming under pressure from internal contradictions. Italy's national prohibition demonstrates that even the European Union's cautious approach is not sufficiently restrictive for some member states.[270]

The Strategic Model. China, by contrast, has taken the most deliberate position. The Chinese state has signaled strong support for cell-cultivated protein as a strategic technology, incorporating it into national development plans, directing research investment, and relying on its existing framework for new food raw materials.[271] But it has not yet opened the market to commercial sales.[272] Instead, the state holds the approval process in reserve while the industry builds production capacity, with the implicit understanding that commercial authorization will follow when the state determines that both the regulatory and industrial conditions are mature.[273] This approach maximizes state control over the timing and terms of market entry. It avoids the American problem of premature political backlash because the state controls the announcement.[274] It also allows the state to calibrate the pace of market opening to the domestic livestock industry's capacity to absorb disruption, a consideration that, in a country where pork alone accounts for a significant share of both agricultural output and cultural identity, is of considerable political importance.[275] The Chinese equilibrium is, in short, the most intentional of the three, reflecting a state that is actively managing the pace of technological commercialization rather than simply responding to it.

The costs of that intentionality fall on everyone outside the state. A firm cannot price an investment against a timetable it cannot see, and the absence

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268. *See supra* Part I.A (American consultation process); *supra* Part II.A (European Union authorization pathway); *supra* note 147 and accompnaying text (Singapore approval of GOOD Meat in 2020).

269. *See* Novel Food Regulation, *supra* note 21, art. 36 (applying from Jan. 1, 2018).

270. *See* Legge n. 172/2023, *supra* note 24, art. 2, para. 1.

271. *See* 14th Five-Year Agricultural Science Plan, *supra* note 198, at 26; New Food Raw Materials Measures, *supra* note 207, art. 4.

272. *See* New Food Raw Materials Measures, *supra* note 207, art. 4. No cell-cultured food had been approved as a new food raw material as of this writing.

273. *See supra* Part III.A.

274. *See supra* Part I.B.

275. *See* FOOD & AGRIC. ORG. OF THE U.N., MEAT MARKET REVIEW: OVERVIEW OF GLOBAL MARKET DEVELOPMENTS IN 2025 8, 11 (2026) [hereinafter MEAT MARKET REVIEW], https://www.fao.org/markets-and-trade/publications/en/?news_files=113402 [https://perma.cc/SQK8-SSJG].

of a published decision point leaves the expected date of market entry a matter of speculation rather than planning.[276] The state that would assess the product also manages the industry the product would displace,[277] and an outside observer has no way to tell which consideration carried a given decision. The approach is likewise the least exportable of the three, presupposing as it does an administration able to hold a technology at the threshold for as long as it chooses. Few jurisdictions possess that capacity, and fewer still possess the political insulation it requires. Strategic patience, in other words, is available only to states that can afford to wait.

B. Definitional Sovereignty: Who Decides What Counts as "Meat"?

Beneath the technical questions of safety assessment and market authorization lies a more fundamental contest: the question of who possesses the authority to define what legally constitutes "meat." This is not a semantic question. The legal definition of "meat" determines market access, labeling requirements, regulatory jurisdiction, and consumer expectations.[278] The state or institution that controls the definition controls the market. This article terms this authority "definitional sovereignty": the power to determine, through legal classification, whether a novel product is included within or excluded from an existing regulatory and commercial category.

Definitional sovereignty runs deeper than policy preference. It engages a deeper question that might be described as the legal ontology[279] of food: when the law classifies a substance as "meat," what is it actually asserting? In the traditional regulatory order, the answer was self-evident. "Meat" was the edible tissue of a slaughtered animal.[280] The act of slaughter was not

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276. *See* New Food Raw Materials Measures, *supra* note 207, art. 11 (running the sixty-day review period from acceptance of an application).

277. New Food Raw Materials Measures, *supra* note 207, arts. 4–5 (NHC and CFSA authority over novel food assessment); 14th Five-Year Agricultural Science Plan, *supra* note 198 (Ministry of Agriculture and Rural Affairs, which oversees the livestock sector, listing cell-cultivated meat among frontier technologies).

278. *See* 21 U.S.C. § 601(j) (defining "meat food product"), § 453(f) (defining "poultry product"); 9 C.F.R. §§ 317.2(e)(1), 317.8(b)(12) (2026) (restricting the use of the term "meat" and the names of particular kinds of meat on labels); Regulation 853/2004 of the European Parliament and of the Council of 29 April 2004 Laying Down Specific Hygiene Rules for Food of Animal Origin, annex I, pt. 1.1, 2004 O.J. (L 139) 55.

279. On the capacity of legal classification to constitute rather than merely describe its objects, *see* JOHN R. SEARLE, MAKING THE SOCIAL WORLD: THE STRUCTURE OF HUMAN CIVILIZATION 99 (2010) (describing institutional facts as created "by representing [them] as existing," and analyzing statutory text as a standing Declaration that brings its object into being).

280. *See* 9 C.F.R. § 301.2 (2025) (defining "meat" as "[t]he part of the muscle of any cattle, sheep, swine, or goats which is skeletal or which is found in the tongue, diaphragm, heart, or esophagus," together with the bone, skin, sinew, nerve and blood vessels normally accompanying the muscle tissue); Regulation 853/2004, *supra* note 278, annex I, pt. 1.1

merely a production method. It was a definitional foundation, a necessary condition for the legal category to apply.[281] Cell-cultivated meat disrupts this settled understanding by producing animal muscle tissue that answers to the definition of meat while no carcass ever comes into being.[282] The legal systems examined in this article have responded to this ontological disruption in divergent ways, and the differences reveal divergent conceptions of what legal classification is for.

In the United States, this definitional contest is playing out at the state level through labeling legislation. As of late 2025, twenty-two states have enacted laws restricting the use of terms such as "meat," "beef," "chicken," and "pork" for products not derived from the slaughter of animals.[283] These laws have generated constitutional litigation, and the results have been inconsistent. In Arkansas, the U.S. District Court for the Eastern District of Arkansas granted a permanent injunction against enforcement of the state's labeling statute, finding that it unconstitutionally restricted Tofurky's commercial free speech rights.[284] In Louisiana, the district court reached the same conclusion, but the Fifth Circuit reversed, holding that the district court had erred in disregarding the state's limiting construction of the statute.[285] In

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(defining "meat" as the "edible parts of the animals referred to in points 1.2 to 1.8, including blood").

281. Slaughter enters both schemes through the definition of carcass. *See* 9 C.F.R. § 301.2 ("Carcass. All parts, including viscera, of any slaughtered livestock."); Regulation 853/2004, *supra* note 278, annex I, pt. 1.9 ("'Carcase' means the body of an animal after slaughter and dressing.").

282. Cells are taken from a living animal to establish a cell bank, multiplied in a controlled environment supplied with nutrients and growth factors, induced to differentiate into muscle, fat, or connective tissue, and then harvested and processed by conventional food methods. *See Human Food Made with Cultured Animal Cells*, *supra* note 39.

283. *See* Ctr. for Agric. & Shale L., Penn State L., *Meat Labeling Law* (issue tracker), https://aglaw.psu.edu/research-by-topic/issue-tracker/meat-labeling-law-new-version/ [https://perma.cc/Y584-TU8G]; *see also Legislative Update*, NALC, *supra* note 7.

284. *See generally* Turtle Island Foods SPC v. Soman, No. 4:19-cv-00514-KGB, 2022 WL 4627711 (E.D. Ark. Sep. 30, 2022) (granting permanent injunction against enforcement of Arkansas Act 501 after applying the *Central Hudson* commercial speech framework and concluding that Tofurky's plant-based product labels were not misleading because they featured prominent qualifiers such as "all vegan," "plant-based," and "veggie" alongside traditional meat terminology).

285. *See generally* Turtle Island Foods SPC v. Strain, 594 F. Supp. 3d 692 (M.D. La. Mar. 28, 2022) (holding Louisiana's Truth in Labeling of Food Products Act unconstitutional under the First Amendment), *rev'd*, 65 F.4th 211 (5th Cir. 2023) (reversing on the ground that the district court erred by substituting its own *Central Hudson* analysis for the State's limiting construction, which confined the statute's reach to representations by companies that actually intend consumers to be misled about whether a product is an agricultural product). *But see* Upton's Naturals Co. v. Stitt, No. CIV-20-938-F, 2020 WL 6808784 (W.D. Okla. Nov. 19, 2020) (denying preliminary injunction against Oklahoma's Meat Consumer Protection Act and applying the more deferential *Zauderer* standard rather than *Central Hudson*, on the ground that the Act's compelled-disclosure requirement—mandating that plant-based

Oklahoma, a preliminary injunction against the state's labeling statute was denied in 2020, and a subsequent challenge was dismissed for lack of standing in 2024.[286] The split in judicial outcomes illustrates a broader pattern: the federal courts have not yet established a uniform doctrinal framework for evaluating the constitutionality of meat-labeling restrictions. This question is likely to reach the federal appellate courts and, potentially, the Supreme Court as the cultivated meat industry matures. At the federal level, USDA-FSIS issued an advance notice of proposed rulemaking on the labeling of cell-cultivated meat products in September 2021, but has not yet issued a proposed rule, leaving the definitional question temporarily in the hands of the states.[287]

That vacuum may not last. On April 30, 2026, legislation was introduced in the House of Representatives under the title Fair and Accurate Ingredient Representation on Labels Act of 2026 (FAIR Labels Act).[288] A cell-cultivated protein product would be misbranded unless its label carried the words "cell-cultivated" immediately adjacent to the name of the food, a statement that the product derives from sources other than meat or poultry, and a disclaimer that it is not naturally produced meat.[289] A plant-based product would carry the phrase "plant-based alternative protein product" followed immediately by the name of the food.[290] The bill would extend the FMIA and the PPIA to cell-cultivated protein products while leaving plant-based products under the FD&C Act, and it would require the Secretaries of Agriculture and of Health and Human Services to revise the 2019 memorandum of understanding within ninety days of enactment.[291] If enacted, the FAIR Labels Act would represent the most significant federal exercise of definitional sovereignty over cultivated meat terminology to date, shifting the locus of naming authority from the states to Congress and potentially preempting the patchwork of state labeling laws that currently governs this space.

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descriptors appear in type uniform in size and prominence to the product name—was reasonably related to the State's interest in preventing consumer deception).

286. *See generally Upton's Naturals Co*., 2020 WL 6808784 (denying preliminary injunction against Oklahoma's Meat Consumer Protection Act); Plant Based Foods Ass'n v. Stitt, No. CIV-20-938-F (W.D. Okla. June 24, 2024) (dismissing a subsequent challenge for lack of standing without reaching the constitutionality of the statute).

287. *See* Labeling of Meat or Poultry Products Comprised of or Containing Cultured Animal Cells, 86 Fed. Reg. 49,491 (Sep. 3, 2021) (advance notice of proposed rulemaking). As of early 2026, FSIS has not issued a proposed rule.

288. *See* Fair and Accurate Ingredient Representation on Labels Act of 2026, H.R. 8596, 119th Cong. (2026). The bill had not been enacted as of the time of writing.

289. *Id.* § 3(a)(2), (b)(2).

290. *Id*. § 3(c)(2).

291. *See id.* §§ 2, 3(a)(3), (b)(3), (c).

The European Union presents a different variant of the definitional contest. Italy's Law No. 172 represents the most explicit assertion of what might be called ontological anxiety in the regulation of cultivated meat.[292] The Italian statute does more than prohibit the sale of cultivated food products. A separate provision reserves meat denominations, barring products made exclusively from vegetable protein from using names, animal references or butchery terminology associated with meat.[293] The prohibition in Article 2 rests on the precautionary principle.[294] The reservation of denominations in Article 3 rests on something else. Its logic approaches an ontological one. The statute ties meat denominations to livestock production, and it does so in the name of a national livestock heritage whose value it describes as cultural, socio-economic and environmental.[295] This position reflects a conception of food law in which legal categories serve not only as functional instruments for organizing regulatory oversight but as expressions of social meaning.[296] The word "meat" does not simply denote a set of nutritional and safety characteristics; it connotes an entire mode of production, a relationship between humans and animals, a cultural heritage and a way of life. To permit a product grown in a bioreactor to bear the name "meat" is, on this view, to dissolve a social contract, to sever the word from its constitutive referent and, in so doing, to undermine the cultural identity that the word both reflects and sustains.

The European Commission has not yet taken a formal position on whether member states may restrict the use of meat-associated terminology for authorized novel foods. The question is complicated by the European Union's own regulatory history: in *Verband Sozialer Wettbewerb*, the European Court of Justice held that plant-based products may not be marketed using designations such as "milk," "butter," or "cheese," which are reserved for products of animal origin under European Union law.[297] Whether this principle extends to cell-cultivated products, which are derived from animal cells, not plants, is an open question with significant

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292. *See* Legge n. 172/2023, *supra* note 24, art. 3.

293. *See* Legge n. 172/2023, *supra* note 24, art. 3, para. 1.

294. *See* Legge n. 172/2023, *supra* note 24, art. 2, para. 1.

295. *See* Legge n. 172/2023, *supra* note 24, art. 3, para. 1.

296. *See* Cass R. Sunstein, *On the Expressive Function of Law*, 144 U. PA. L. REV. 2021, 2043–44 (1996).

297. Case C-422/16, Verband Sozialer Wettbewerb eV v. TofuTown.com GmbH, ECLI:EU:C:2017:458, ¶¶ 27, 52 (June 14, 2017) (holding that the names "whey," "cream," "butter," "cheese," and "yogurt" are reserved exclusively for products of animal origin under Article 78(2) and Annex VII, Part III of Regulation (EU) No 1308/2013, and may not be used to designate purely plant-based products even when accompanied by clarifying or descriptive qualifiers).

implications for the industry's ability to communicate the nature of its products to consumers.

China's approach to the definitional question stands in instructive contrast. As discussed in Part III, the Chinese-language terminology for cell-cultivated meat is not yet standardized, and several terms compete in regulatory and public discourse. What is notable about the Chinese approach is its functionalist orientation. Unlike the Italian model, which treats the definition of "meat" as a matter of cultural and ontological integrity,[298] China has yet to define cell-cultured products for regulatory purposes. Its framework for novel materials turns on substantive equivalence, asking whether a proposed ingredient matches an existing food in species, source, principal components, edible portion and conditions of use.[299] The question a Chinese regulator would face is accordingly one of fitting the product into an existing safety framework rather than one of preserving a category. This functionalist approach is consistent with the broader orientation of Chinese food safety governance, which proceeds through risk assessment and national food safety standards.[300]

The contrast between Italy's ontological anxiety and China's functionalist pragmatism thus reveals a fundamental divergence in the regulatory philosophy of food classification. For Italy, the legal definition of "meat" is a boundary marker that protects a cultural identity from technological erosion.[301] For China, the legal definition is a regulatory instrument to be calibrated for maximum administrative efficiency and industrial coherence.[302] The American approach occupies a position between these poles. The federal system's functionalist instinct treats cultivated chicken as chicken for regulatory purposes.[303] State legislatures have rejected that premise, however, insisting that "meat" must come from slaughter and that products of cellular agriculture are, by their nature, something else.[304] In all three jurisdictions, the power to name is the power to regulate, and definitional sovereignty over the legal meaning of "meat" remains one of the least examined dimensions of the global regulatory contest over cultivated protein.

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298. *See* Legge n. 172/2023, *supra* note 24, arts. 1, para. 1, 3, para. 1.
299. *See* New Food Raw Materials Measures, *supra* note 207, art. 23.
300. *See* Food Safety Law, *supra* note 216, arts. 17, 21, 28.
301. *See supra* Part II.B.
302. *See supra* Parts III.C–D.
303. *See supra* Part I.A.
304. *See supra* Part I.B.

C. The Political Economy of Resistance and International Trade Law

The most visible source of resistance to cell-cultivated meat in all three jurisdictions is the incumbent livestock industry. In the United States, the states that have enacted bans are significant livestock producers, and appeals to the protection of domestic agriculture appear openly in the legislative materials.[305] In Italy, similarly, the ban was framed as a defense of the national livestock heritage in its cultural, socio-economic and environmental value.[306] In China, by contrast, the sector is not an outside interest lobbying the state. Pork accounts for the majority of domestic meat supply, and China produces nearly half of the world's pork.[307] The state already manages the sector directly, holding central pork reserves for price stabilization and setting targets for breeding sow inventory under a hog capacity regulation scheme.[308] An industry already managed by the state has no need of legislation to slow a competitor. The pace of entry is set through approval instead. No new food raw material may be used in food production or trade until the health authorities have completed a safety review,[309] and oversight of cell-cultured food may therefore serve a second function alongside the protection of food safety, which is to determine how quickly the domestic livestock industry is exposed to competition. In none of the three, however, is the motivation stated outright, and it may coexist with genuine safety and strategic concerns.

The mechanisms of resistance differ across jurisdictions but follow recognizable institutional channels. In the United States, resistance operates through state legislatures, the most politically accessible branch of government for agricultural interests, and takes the form of outright

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305. *See, e.g.*, TEX. S.B. 261 BILL ANALYSIS, *supra* note 17; Bamer, *supra* note 17 (reporting the governor, a hog farmer, presenting the prohibition as a defense of the state's agricultural industry).

306. *See* Legge n. 172/2023, *supra* note 24, art. 3, para. 1.

307. *See* MEAT MARKET REVIEW, *supra* note 275, at 8, 11.

308. *See Shangwubu Deng Bumen Kaizhan Zhongyang Chubei Dong Zhurou Shouchu* (商务部等部门开展中央储备冻猪肉收储) [*Ministry of Commerce and Other Departments Carry Out Central Reserve Frozen Pork Purchases*], ZHONGHUA RENMIN GONGHEGUO SHANGWUBU (中华人民共和国商务部) [MINISTRY OF COM.] (Apr. 2, 2026), https://www.mofcom.gov.cn/xwfb/rcxwfb/art/2026/art_a7ed6135ee8c42408d50b2fe91f30df5.html [https://perma.cc/ML4K-U5XF] (China); Nongye Nongcunbu Guanyu Yinfa "Shengzhu Channeng Zonghe Tiaokong Shishi Fang'an (2026 Nian Xiuding)" De Tongzhi (农业农村部关于印发《生猪产能综合调控实施方案（2026年修订）》的通知) [Notice on Issuing the Comprehensive Hog Capacity Regulation Implementation Plan (2026 Revision)], Zhonghua Renmin Gongheguo Nongye Nongcunbu (中華人民共和國農業農村部) [Ministry of Agric. & Rural Affs.], Doc. No. Nongmufa [2026] No. 6 (May 3, 2026), https://www.hunan.gov.cn/zqt/zcsd/202605/t20260518_33979020.html (on file with the *Fordham Urban Law Journal*) (China).

309. *See* New Food Raw Materials Measures, *supra* note 207, art. 4.

prohibition.[310] In the European Union, it operates both through member state legislation (Italy) and through the structural conservatism of the Novel Food pathway, which imposes costs and delays that advantage established food products over novel ones.[311] In China, resistance is less overt and operates within the state rather than against it.[312] National agricultural science and technology planning names cell-cultured meat as a research priority under the heading of future food manufacturing,[313] yet the health authorities responsible for approving new food raw materials have not brought any cell-cultured product through that process. The timing is set administratively rather than legislatively,[314] and the disruption of existing livestock and processing industries is paced without any explicit prohibition.

There is, however, a common thread. In all three jurisdictions, the resistance to cultivated meat is animated as much by a perceived threat to cultural identity as by economic self-interest.[315] Meat production is not just an industry; in many communities, it is a way of life. Texas ranching, Italian gastronomy, and Chinese pork culture are each deeply intertwined with regional and national identities in ways that make the introduction of "lab-grown" alternatives feel not merely economically threatening but culturally transgressive.[316] This cultural dimension helps explain why the political resistance to cultivated meat has been far more intense than the resistance to other food innovations, such as plant-based alternatives, that threaten the same economic interests but do not challenge the same cultural symbols.

The intensity of political resistance, however, does not determine its legality under international trade law. The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement) imposes discipline on measures that restrict trade in food products.[317] The

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310. *See supra* Part I.B.

311. *See supra* Parts II.A–II.B.

312. *See supra* Part III.A.

313. *See* 14th Five-Year Agricultural Science Plan, *supra* note 198, at 26.

314. *See* New Food Raw Materials Measures, *supra* note 207, arts. 4, 11, 16.

315. *See supra* Part I.B (American state bans framed in the language of agricultural heritage); *supra* Part II.B (Italy's prohibition as a defense of national livestock heritage and cultural identity); *supra* Part III.A (China's strategic positioning of cell-cultured meat within state-managed food production).

316. *See* NICK FIDDES, MEAT: A NATURAL SYMBOL 38–45 (1991) (arguing that meat's significance far exceeds its nutritional and economic value and concluding that "meat is more than just a meal; it also represents a way of life"); Christopher Bryant & Julie Barnett, *Consumer Acceptance of Cultured Meat: A Systematic Review*, 143 MEAT SCI. 8 (2018) (synthesizing fourteen empirical studies and identifying perceived unnaturalness as among the most common consumer objections to cultured meat).

317. *See* Agreement on the Application of Sanitary and Phytosanitary Measures, arts. 2.2, 2.3, 5.1, 5.5, 13, Apr. 15, 1994 [hereinafter SPS Agreement]; Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1867 U.N.T.S. 493.

SPS Agreement requires that measures shall be "based on scientific principles" and shall not be "maintained without sufficient scientific evidence."[318] It further requires that SPS measures be "based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health."[319] It also prohibits "arbitrary or unjustifiable distinctions" in the levels of sanitary protection applied in different situations where such distinctions result in disguised restrictions on international trade.[320]

The prohibitions on the manufacture and sale of cell-cultivated meat enacted by eight states as of September 2026, three of them for a fixed term,[321] as distinct from the labeling restrictions discussed in Section B above, present the most glaring tension with these disciplines. WTO Members bear responsibility for ensuring that sub-federal entities comply with their obligations,[322] meaning that the United States would be the respondent in any WTO challenge to state-level measures. The records of these enactments assert risk without documenting it. In Texas, the bill analysis names contamination and long-term health effects among the concerns behind the prohibition yet cites no assessment of either.[323] In Florida, the prohibition arrived as two sections of an omnibus agriculture bill whose Senate analysis records no assessment at all.[324] The federal position is otherwise. The FDA has completed pre-market consultations for cultured cell material from several species and raised no further questions about the producers' safety conclusions.[325] For species regulated under the FMIA and the PPIA, oversight passes to the FSIS at harvest, and no such product may be sold without a grant of inspection and pre-approved labeling.[326] A prohibition that rests on no assessment and bars what the federal authorities have cleared is difficult to reconcile with the requirement that SPS measures be based on scientific principles and sufficient scientific evidence.[327] Nor do the two fixed-term measures qualify as provisional ones. Neither requires

318. SPS Agreement, *supra* note 317, art. 2.2.

319. *Id*. art. 5.1.

320. *Id*. art. 5.5.

321. ALA. CODE § 20-1-161 (2024); FLA. STAT. § 500.452 (2025); IND. CODE § 15-17-5-6.1 (2025); MISS. CODE ANN. § 75-35-15 (2025); MONT. CODE ANN. §§ 50-31-501(6), 50-31-511 (2025); NEB. REV. STAT. § 81-2282 (2025); TEX. HEALTH & SAFETY CODE ANN. § 433.057 (West 2025); S.B. 124, 2026 Leg., Reg. Sess. (S.D. 2026).

322. *See* SPS Agreement, *supra* note 317, art. 13.

323. *See* TEX. S.B. 261 BILL ANALYSIS, *supra* note 17.

324. *See* FLA. STAT. § 500.452 (2024); FLA. S.B. 1084 BILL ANALYSIS, *supra* note 101.

325. *See Pre-Market Inventory*, FDA, *supra* note 69.

326. FDA-USDA FORMAL AGREEMENT, *supra* note 16, at 2–3; *Human Food Made with Cultured Animal Cells*, *supra* note 39.

327. *See* SPS Agreement, *supra* note 317, art. 2.2.

the seeking of additional information, and neither provides for review before expiry.[328]

Moreover, the protectionist motivation behind the state bans, explicitly stated in the legislative record, may trigger Article 5.5's prohibition on "arbitrary or unjustifiable distinctions" in levels of sanitary protection that result in disguised restrictions on international trade.[329] A state that permits the sale of conventional meat produced in industrial feedlot conditions while prohibiting the sale of cell-cultivated meat that has been evaluated and cleared by the FDA is maintaining materially different levels of protection for products that pose comparable food safety risks, with conventional livestock breeding carrying a considerably higher chance of transmitting animal-borne pathogens than cell culture.[330] The distinction is difficult to justify on scientific grounds and appears instead to reflect the political influence of incumbent agricultural interests, precisely the kind of disguised trade restriction that Article 5.5 is designed to discipline.[331] The fact that the current bans are domestic rather than trade-border measures does not insulate them from SPS scrutiny: Article 2.3 explicitly provides that SPS measures shall not be applied in a manner that would constitute a disguised restriction on international trade,[332] and the SPS Agreement makes no distinction between border measures and internal regulations in its substantive obligations.[333]

The European Union's approach is, by contrast, in a considerably stronger position under WTO law, precisely because it requires a scientific risk assessment.[334] The Novel Food Regulation permits authorization only where scientific evidence shows no safety risk to human health, and EFSA's

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328. *See* IND. CODE § 15-17-5-6.1 (2025); TEX. HEALTH & SAFETY CODE ANN. § 433.057 (West 2025). *Compare* SPS Agreement, *supra* note 317, art. 5.7 (permitting provisional measures where relevant scientific evidence is insufficient, on condition that the Member seek the additional information necessary for a more objective assessment and review the measure within a reasonable period of time).

329. SPS Agreement, *supra* note 317, art. 5.5; *see also* Appellate Body Report, *Australia—Measures Affecting Importation of Salmon*, WT/DS18/AB/R, ¶¶ 159, 166, 170–78 (adopted Nov. 6, 1998).

330. *See* FOOD & AGRIC. ORG. OF THE U.N. & WORLD HEALTH ORG., FOOD SAFETY ASPECTS OF CELL-BASED FOOD 26 (2023), https://doi.org/10.4060/cc4855en (on file with the *Fordham Urban Law Journal*) (identifying the transmission of zoonotic and foodborne pathogens from the source animal as a hazard of cell-based production while noting that the chances are considerably lower than in conventional livestock breeding).

331. *See supra* Part I.B; SPS Agreement, *supra* note 317, art. 5.5.

332. *See* SPS Agreement, *supra* note 317, art. 2.3.

333. *See* Marrakesh Agreement Establishing the World Trade Organization, *supra* note 317, at Annex 1A (defining the covered measures by their purpose rather than by the point at which they operate).

334. *See* Novel Food Regulation, *supra* note 21, arts. 10–12.

evaluation provides that evidence in practice.[335] This requirement that authorization rest on scientific evidence is consistent with the SPS mandate for risk-based measures.[336] The European Union can argue, with considerable justification, that its approach is precautionary but scientifically grounded, not arbitrary. Italy's national ban presents a more difficult case. If Italy maintains its prohibition after a cultivated meat product has cleared the Union's *ex ante* assessment and received EU-wide authorization, the scientific basis for the Italian restriction becomes exceedingly difficult to identify.

China's approach is perhaps the most defensible under WTO law, because it does not prohibit cultivated meat; it simply has not yet approved it. The absence of an approval is not the same as a prohibition.[337] Though this distinction could be contested if a pattern of indefinite non-approval were shown to function as a de facto prohibition,[338] the current posture suggests otherwise. Active standard development and ongoing expert consultation support the characterization of China's approach as genuinely preparatory rather than restrictively motivated.[339] China can point to its ongoing development of safety assessment guidelines and its establishment of expert working groups as evidence that it is proceeding on a scientifically informed basis.[340] The SPS Agreement provides a provisional safe harbor for measures adopted in cases where "relevant scientific evidence is insufficient," a provision that China could invoke to justify its cautious timeline while the safety assessment framework is under development.[341] Figure 2 plots each regulatory regime on two dimensions, the degree of market access restriction imposed and the strength of the scientific justification supporting that restriction, to illustrate the resulting pattern of SPS exposure.

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335. *See* Novel Food Regulation, *supra* note 21, arts. 6(2), 7(a), 11.

336. *See* SPS Agreement, *supra* note 317, art. 5.1.

337. *See* SPS Agreement, *supra* note 317, art. 5.7.

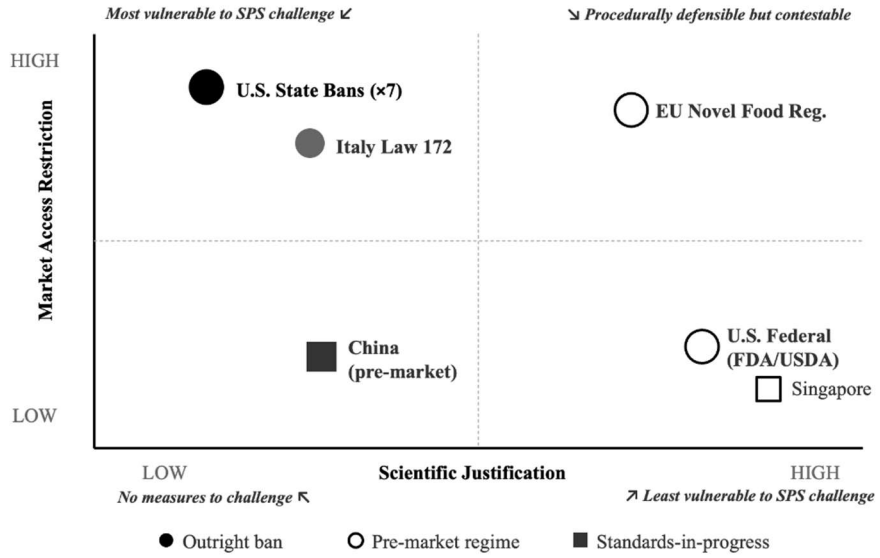
338. *See* SPS Agreement, *supra* note 317, art. 8, annex C(1)(a).

339. *See* CFSA, 55th CCFA Session, *supra* note 201; China Gen. Chamber of Com., *supra* note 28.

340. *See* CFSA, 55th CCFA Session, *supra* note 201; China Gen. Chamber of Com., *supra* note 28.

341. SPS Agreement, *supra* note 317, art. 5.7.

Figure 2. SPS Vulnerability Matrix: Scientific Justification vs. Market Restriction[342]



The WTO analysis thus produces a striking irony. The United States, the world's most prominent advocate of rules-based free trade and science-based sanitary standards, is the jurisdiction whose domestic measures on cultivated meat are most vulnerable to challenge under the SPS Agreement.[343] The state-level bans are non-scientific, protectionist, and lack the risk-assessment basis that WTO disciplines require.[344] The European Union's procedural caution is legally defensible,[345] even if commercially burdensome.[346] China's strategic patience is largely immune to WTO challenge, because the state has not enacted a prohibition but has simply not yet approved distribution, a distinction that international trade law is not well equipped to police.[347] The following Part examines what this non-convergence means in practice for companies, for consumers, and for the emerging architecture of global protein trade.

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342. Source: Author's analysis based on the regulatory frameworks discussed *supra* Parts I–III and the SPS Agreement obligations discussed in this Part.

343. *See* Table 1.

344. *See* SPS Agreement, *supra* note 317, arts. 2.2, 5.1.

345. *See* Novel Food Regulation, *supra* note 21, arts. 10–12; EFSA, *Novel Food Guidance*, *supra* note 135.

346. *See supra* Part II.A (discussing the cost and timeline of the Novel Food authorization process).

347. *See* SPS Agreement, *supra* note 317, art. 8, annex C(1)(a); *see also supra* Part III.A.

V. THE GOVERNANCE GAP: NON-CONVERGENCE AND ITS CONSEQUENCES

The regulatory divergence documented in the preceding Parts has immediate practical consequences. A single cultivated meat product can simultaneously be federally approved, state-prohibited, EU-unauthorized, and China-pending, a condition that amounts not to regulatory pluralism but to regulatory incoherence. This Part maps that incoherence,[348] considers the pathways toward coordination, however tentative,[349] and revisits the trade-law consequences of allowing the divergence to persist.[350]

A. The Architecture of Non-Convergence

To grasp the scale of the problem, consider the situation of a company that has received FDA pre-market clearance and a USDA grant of inspection for a cell-cultivated chicken product.[351] That product cannot be sold in eight American states that have enacted statutory prohibitions.[352] It cannot be sold in any European Union member state, because no cultivated meat product has received Novel Food authorization.[353] Nor can it be sold in China, because no cultivated meat product has received "new-food raw-material" approval.[354] Moreover, if it were eventually authorized at the European Union level, it still could not be sold in Italy without challenging an explicit national ban.[355] The same molecule of chicken protein, produced from the same cell line in the same bioreactor, thus occupies five distinct legal statuses across jurisdictions. The result is a form of regulatory incoherence that no single jurisdiction has chosen but that the interaction of their decisions has produced.[356]

The commercial implications of this incoherence are considerable. No mutual recognition agreements exist among the three jurisdictions for cultivated meat approvals.[357] A company seeking to sell its product in the United States, the European Union, and China must accordingly complete three entirely separate regulatory processes, each with its own institutional

348. *See infra* Part V.A.
349. *See infra* Part V.B.
350. *See infra* Part V.C.
351. *See Pre-Market Inventory*, FDA, *supra* note 69; CRS REPORT, *supra* note 12, at 3.
352. *See supra* notes 7–8 and accompanying text.
353. *See supra* Part II.A.
354. *See* NHC, *Acceptance Notices*, *supra* note 207.
355. *See supra* Part II.B.
356. *See supra* Parts I–III.
357. *See supra* Parts I.A, II.A, III.B (describing three independent approval processes with no cross-jurisdictional recognition mechanism).

requirements, evidentiary standards, and timelines.[358] The safety data generated for the FDA pre-market consultation may be relevant to a European Novel Food application or a Chinese "new-food raw-material" submission, but it does not satisfy those jurisdictions' requirements.[359] Each system demands compliance on its own terms.

At the multilateral level, the governance gap is equally pronounced. The Codex Alimentarius Commission (Codex), the joint body of the Food and Agriculture Organization and the World Health Organization responsible for developing international food standards,[360] has not yet issued standards addressing cell-cultivated meat.[361] Codex standards, while not binding, serve as the international benchmark under the SPS Agreement.[362] WTO Members are required to base their sanitary and phytosanitary measures on international standards where they exist, and measures that conform to such standards are presumed consistent with the Agreement.[363] The FAO and WHO jointly published technical guidance on cell-based food safety in 2023, and FAO has since issued further reports on precision fermentation and regulatory frameworks, but these remain technical guidance documents rather than Codex standards.[364] The topic has been raised at the executive committee level, with member states including Singapore, China, and New Zealand[365] submitting comments on the potential need for Codex work in

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358. *See* FDA-USDA FORMAL AGREEMENT, *supra* note 16 (United States); Novel Food Regulation, *supra* note 21, arts. 10–12 (European Union); New Food Raw Materials Measures, *supra* note 207, arts. 4–6 (China).

359. *Cf. Pre-Market Inventory*, FDA, *supra* note 69 (FDA consultation process); EFSA, *Novel Food Guidance*, *supra* note 135 (EU evidentiary requirements); New Food Raw Materials Measures, *supra* note 207, art. 6 (Chinese submission requirements).

360. Statutes of the Codex Alimentarius Commission, art. 1(c)–(d), *in* CODEX ALIMENTARIUS COMM'N, PROCEDURAL MANUAL, at 7 (2025) [hereinafter CODEX PROCEDURAL MANUAL], https://openknowledge.fao.org/server/api/core/bitstreams/28cc145b-f0a0-44f5-940d-211c4f8e7d62/content [https://perma.cc/6T34-ZHLE] (charging the Commission with initiating, guiding, and finalizing international food standards).

361. *See* CFSA, 55th CCFA Session, *supra* note 201.

362. SPS Agreement, *supra* note 317, arts. 3.1–3.3.

363. SPS Agreement, *supra* note 317, arts. 3.1–3.2.

364. FOOD & AGRIC. ORG. OF THE U.N. & WORLD HEALTH ORG., FOOD SAFETY ASPECTS OF CELL-BASED FOOD (2023), https://doi.org/10.4060/cc4855en [https://perma.cc/JF25-CTVX]; FOOD & AGRIC. ORG. OF THE U.N., REGULATORY FRAMEWORKS FOR CELL-BASED FOODS AND PRECISION FERMENTATION-DERIVED PRODUCTS (2026), https://doi.org/10.4060/cd8165en [https://perma.cc/5SFE-XQW5]; FOOD & AGRIC. ORG. OF THE U.N., PRECISION FERMENTATION—WITH A FOCUS ON FOOD SAFETY (M. Sturme, J.P. van der Berg & G. Kleter eds., 2025), https://doi.org/10.4060/cd4448en [https://perma.cc/J5U3-HGSW].

365. New Zealand has regulated the sale of cell-cultured food, though not its production. Standard 1.5.4 and the related permissions, composition and labeling measures apply in both Australia and New Zealand. Standard 3.4.1 and the whole of Chapter 3 of the Code apply in Australia alone, as Chapter 3 has never formed part of the joint Australia-New Zealand food

this area, but no formal work program has been initiated.[366] In the absence of Codex standards for cultivated meat, a universally accepted baseline is not available for evaluating national measures, thus allowing and potentially incentivizing regulatory fragmentation, a phenomenon that this article has documented.

B. Pathways Toward Coordination

Several pathways toward greater regulatory coordination are conceivable, though none are imminent. Each carries its own institutional logic and political constraints.

The bilateral model offers the most promising near-term opportunity. The January 2023 discussions between the FDA and China's CFSA on the safety assessment of cultivated meat demonstrated that bilateral regulatory dialogue on this topic is both feasible and mutually valued. The expansion of this discourse to incorporate the European Food Safety Authority (EFSA) could create a tripartite forum for the dissemination of safety assessment methodologies and data, thereby minimizing redundancy and fostering mutual comprehension, which is a fundamental prerequisite for enhanced official coordination. A forum does not necessarily need to aim for harmonization; rather, even the more modest goal of mutual recognition of safety assessments would have significant regulatory advantages. This would entail agreeing that an assessment conducted by one jurisdiction's competent authority will be accepted as relevant evidence in another jurisdiction's approval process, thereby considerably reducing the regulatory burden on applicants and accelerating global market access.

The multilateral pathway runs through the Codex Alimentarius Commission, which remains the appropriate forum for developing international standards for cultivated meat.[367] Codex standard-setting is, however, slow and consensus-based, and the current political sensitivity of cultivated meat in major member states suggests that progress will be measured in years rather than months. Nonetheless, the initiation of the

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standards system. In New Zealand, the production of cell-cultured food falls instead under an independently evaluated risk management program under the Animal Products Act 1999 (N.Z.) or an independently evaluated food control plan under the Food Act 2014 (N.Z.). FSANZ treated production in New Zealand as outside the scope of the application and a matter for the New Zealand Government. A1269 APPROVAL REPORT, *supra* note 148, at 2, 25, 40.

366. *See* Codex Alimentarius Comm'n, Exec. Comm., 82d Sess., *New Food Sources and Production Systems: Information Requested by Members and Observers*, CX/EXEC 22/82/4 (June 2022), https://www.fao.org/fao-who-codexalimentarius/sh-proxy/pt/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-702-82%252FWD%252FEx82_04e.pdf [https://perma.cc/BEF3-WA6Z].

367. *See* CODEX PROCEDURAL MANUAL, *supra* note 360, at 7.

Codex process, beginning with the establishment of an electronic working group or a discussion paper at the Codex Committee on Food Labelling or the Codex Committee on Food Hygiene, would signal institutional engagement with the issue and begin the process of building the technical consensus that any future international standard will require.

A third pathway operates through emulation rather than negotiation. The first two presuppose that the relevant authorities convene, whereas this one requires only that a first mover supply a template that later adopters can adapt to their own administrative structures, and convergence then emerges without any formal instrument.[368] The Singapore Food Agency's 2020 authorization of GOOD Meat's cultivated chicken[369] has the attributes of such a template. It routes cultivated products through an existing novel food framework rather than a purpose-built statutory regime. Adopters therefore work from machinery they already possess. Its criteria rest on reference documents that most regulators accept, among them FDA and EFSA guidance, FAO and WHO risk assessment principles, and Codex guidelines on recombinant DNA microorganisms and animals.[370] Two recent decisions mark the range. Hong Kong admitted Vow's cultivated quail in 2024 without a dedicated regime, relying on the clearance Singapore had granted.[371] Australia and New Zealand reached a comparable outcome by other means. Food Standards Australia New Zealand assessed the same product independently and enacted a regime of its own, two standards and a schedule, only part of which binds both countries.[372] Emulation is unreliable in its consequence. Much turns on each borrowing state's political tolerance for the technology and on the statutory architecture receiving the template. Nothing assures that borrowed standards will be applied with comparable stringency.[373] The pathway needs no diplomatic infrastructure, however, and works on a shorter timescale than either the bilateral or the Codex track.

Of these three pathways, the bilateral model is the most immediately actionable, the Codex process the most institutionally authoritative, and

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368. *See* Richard Rose, *What Is Lesson-Drawing?*, 11 J. PUB. POL'Y 3, 5–9, 20–26 (1991); *cf.* ANU BRADFORD, THE BRUSSELS EFFECT: HOW THE EUROPEAN UNION RULES THE WORLD, ch. 2 (2020) (describing conformity compelled by market access rather than voluntary borrowing).

369. *See* Mike Ives, *Singapore Approves a Lab-Grown Meat Product, a Global First*, N.Y. TIMES (Dec. 2, 2020), https://www.nytimes.com/2020/12/02/business/singapore-lab-meat.html (on file with the author).

370. *See* SFA, *Novel Food Requirements*, *supra* note 190, §§ 2.1, 3.6, 5.6.8.3, 5.10.7.

371. *See* A1269 APPROVAL REPORT, *supra* note 148, at 7 (recording that no specific regulations govern the production or sale of cultured meat in Hong Kong and that the product satisfied the safety assessment requirements of the Centre for Food Safety by drawing on the approval granted by the Singapore Food Agency).

372. *See* A1269 APPROVAL REPORT, *supra* note 148, at 2.

373. *See* Rose, *supra* note 368, at 18–27.

emulation the least demanding of formal agreement. None of the three is sufficient on its own, and their interaction may prove more productive than any single track.

C. The WTO Dimension Revisited

The fragmentation problem is more than a commercial inconvenience; it carries consequences under international trade law that compound over time. As Part IV has argued, the American state-level bans are the measures most vulnerable to SPS challenge, while the European Union's precautionary approach rests on a defensible scientific foundation, and China's non-approval posture largely escapes WTO scrutiny. But the longer the divergence persists, the more deeply it will embed itself in the institutional structures of each jurisdiction, and the more difficult any future coordination will become.

The stakes of this analysis, moreover, extend well beyond cultivated meat. The regulatory patterns documented here, the tension between federal innovation and subnational resistance in the United States, the structural delay inherent in the European Union's precautionary architecture, and China's strategic sequencing of standards and markets, are likely to recur as other novel food technologies seek market access across jurisdictions. Precision fermentation, insect-based proteins, and gene-edited crops will each encounter variants of the same regulatory divergence. The cultivated meat case is thus not only a study in food law; it is also a preview of the governance challenges that will define the regulation of food-system innovation for decades to come.

CONCLUSION

This article has mapped the regulatory terrain of cell-cultivated meat across the three largest food markets in the world and found not convergence but structural divergence: divergence rooted in the constitutional architecture, institutional design, and political economy of each jurisdiction, and showing no sign of abating.

The United States has produced what this article terms a dual fragmentation. At the federal level, the FDA and USDA adapted existing statutory authority with considerable institutional creativity, constructing an innovation-permissive pathway that brought cell-cultivated chicken to American tables in 2023. At the state level, however, a countermovement driven by agricultural incumbency and cultural politics produced outright prohibitions in eight states, most carrying criminal penalties, triggering constitutional litigation that now tests the boundaries of federal preemption and the dormant Commerce Clause. The result is a food system in which a product bearing the USDA mark of inspection is simultaneously legal and

criminal depending on geography, a condition that is untenable as a matter of constitutional principle and corrosive as a matter of regulatory coherence.

The European Union, for its part, has channeled cell-cultivated meat into its precautionary architecture with characteristic rigor and characteristic slowness. The Novel Food Regulation is scientifically grounded, procedurally demanding, and structurally incapable of the kind of rapid market access that the American federal framework has produced. Italy's outright prohibition adds a further layer of complexity, asserting a form of cultural sovereignty over food classification that sits uneasily with the single market principles on which the Union's regulatory architecture depends. The tension between EU-level authorization and member-state prohibition has not yet been tested, but it is structurally unavoidable once a cultivated meat product eventually receives Novel Food approval.

China, by contrast, has adopted what is perhaps the most strategically coherent approach of the three: building the full apparatus of regulatory governance, including safety assessment guidelines, technical standards, expert working groups, and a dedicated regulatory vocabulary, before granting commercial market access. This sequencing ensures that when approval comes, it will come on the state's terms and at the state's chosen moment. It is a model of technology governance in which the state is neither the market's servant nor its adversary but its architect, a model whose implications extend well beyond the food sector.

The three dimensions introduced at the outset can now be examined in turn, each illuminating a different facet of how legal systems respond to technological disruption. The innovation-safety equilibrium varies across different legal jurisdictions. In the United States, the focus is on speed. In the European Union, it is on caution. In China, it is on control. Definitional sovereignty, i.e., the question of who possesses the legal authority to determine what counts as "meat," has become a site of intense political contestation, comparable to any trade dispute. Italy's ontological anxiety is in sharp contrast to China's functionalist pragmatism. The political economy of incumbent resistance, driven by the livestock industry in all three jurisdictions but operating through different institutional channels, ensures that the path from laboratory to table will be contested at every step.

The international trade law dimension deepens the paradox still further. The WTO's SPS Agreement requires that food safety measures rest on scientific risk assessments. The American state-level bans, enacted without scientific justification, driven by protectionist motivation, and explicitly framed in the language of cultural politics rather than public health, are the measures most vulnerable to international legal challenge. The United States, historically the foremost advocate of science-based trade standards, has thus produced the regulatory regime most at odds with the principles it champions. The European Union's approach, for all its procedural burden,

rests on defensible scientific ground. China's approach, for all its opacity, has not prohibited what it has not yet evaluated. The United States is therefore the jurisdiction whose measures are most exposed to challenges under the SPS Agreement. For the moment, the vulnerability remains theoretical, since no WTO Member has yet acquired a sufficient trade interest in cultivated meat exports to the United States to bring a dispute. But the legal exposure will crystallize as production scales and international trade in cultivated protein develops.

The stakes of this non-convergence are not, moreover, limited to a single industry. The global food system is facing a combination of challenges, including climate change,[374] resource depletion,[375] population growth,[376] the risk of zoonotic diseases,[377] and antimicrobial resistance.[378] Consequently, the diversification of protein sources is at once an ecological necessity, a public health imperative, and an economic opportunity. Cell-cultivated meat is one component of a broader portfolio of alternative proteins that could reduce the environmental footprint of protein production while maintaining nutritional adequacy. Whether these technologies fulfill their potential depends in significant part on the regulatory conditions under which they are permitted to reach consumers. Regulatory fragmentation of the kind documented in this article does more than delay commercialization; it fragments the research incentive, distorts investment flows, and slows the pace at which the global food system can adapt to the challenges of the twenty-first century.

For food law scholars, the cultivated meat case offers a living laboratory for studying how legal systems respond to technological disruption that

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374. Carolyn Opio, *FAO's Work on Climate Change: Livestock and Climate Change*, FOOD & AGRIC. ORG. OF THE U.N. (2016), https://openknowledge.fao.org/handle/20.500.14283/i6345en (last visited July 25, 2026) (on file with the *Fordham Urban Law Journal*) (reporting that livestock supply chains account for 14.5 percent of human-caused greenhouse gas emissions, amounting to 7.1 gigatonnes of carbon dioxide equivalent per year).

375. Tae Kyung Hong et al., *Current Issues and Technical Advances in Cultured Meat Production: A Review*, 41 FOOD SCI. ANIMAL RES. 355, 357 (2021).

376. *Id.* at 355.

377. *Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission*, U.N. ENV'T PROGRAMME & INT'L LIVESTOCK RSCH. INST. (2020), https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and [https://perma.cc/F5P8-GE4Z] (identifying intensified livestock production and agricultural intensification among the anthropogenic drivers of zoonotic disease emergence).

378. WORLD HEALTH ORG., COMPREHENSIVE REVIEW OF THE WHO GLOBAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE 1 (2022), https://www.who.int/publications/i/item/9789240062702 [https://perma.cc/2STJ-L2EN] (noting that antimicrobials sold for animal use account for more than seventy percent of global sales, with demand projected to rise as livestock production intensifies).

challenges not only existing regulatory categories but also existing cultural and economic identities. It reveals the conditions under which the legal definition of a food product, what may be called "meat," who may sell it, and under what conditions, becomes a site of political contestation as consequential as any dispute over trade policy, environmental regulation, or intellectual property. For policymakers, it offers a cautionary lesson: regulatory fragmentation in a domain as fundamental as food carries costs that extend well beyond trade barriers and compliance burdens, eroding the capacity of the global food system to respond to the environmental, ethical, and security challenges that define this century.

The regulatory divergence documented in this article is unlikely to resolve itself. The divergence is rooted in constitutional architecture, institutional design, and the political economy of food systems that differ fundamentally across jurisdictions. Convergence, if it comes, will require not merely technical coordination but a reckoning with the deeper question that cultivated meat forces upon every legal system it enters: whether the legal definition of food is a functional instrument to be updated as technology evolves, or a cultural boundary to be defended against technological change. The three jurisdictions examined here have given three different answers. The consequences for trade, for consumers, and for the capacity of the global food system to meet the demands of the coming decades will be shaped by those answers for years to come.