CALIFORNIA DEPARTMENT OF
FOOD & AGRICULTURE
Karen Ross, Secretary

December 9, 2025

Subject: Aquatic Crop Production as a Nutrient-to-Feed Solution for California Dairies Final Report

Dear Partners and Stakeholders,

We commend California Department of Food and Agriculture's (CDFA) Office of Agricultural Resilience and Sustainability (OARS) accomplishments with the 2022 funding cycle of the CLIM^{3}ATE-RP (California Livestock Methane Measurement, Mitigation, and Thriving Environments Research Program) as instrumental to advancing California's climate goals and strengthening the long-term environmental and economic sustainability of the state's livestock sector. In the critical program focus area of Manure Recycling and Innovative Product Development, Fyto, Inc., was awarded $2,000,000 to evaluate the use of *Lemna minor* (duckweed) for nutrient recovery from dairy digester effluent. This project addressed both methane reduction and nitrogen management by transforming digestate into a nutrient-dense biomass—offering a sustainable, circular solution rooted in science and innovation. Upon completion of the project, Fyto, Inc., has shared results of their research as well as insight into their experiences and obstacles within the Final Report, including their experience with the CDFA Commercial Feed Regulatory Program (CFRP), U.S. Food and Drug Administration (FDA), and American Association of Feed Control Officials (AAFCO). The contents of the Final Report are solely the responsibility of the authors and do not necessarily represent the official views of the CDFA.

CFRP has worked diligently, and in collaboration with OARS, to educate industry stakeholders, including researchers, on the federal and state laws, regulations, and processes to bring new and novel feed ingredients to the commercial feed market. These federal and state safeguards help to ensure a safe and wholesome supply of meat, milk, and eggs for the benefit of the consumer. Since 2022, CFRP has published multiple Notice to Industry and guidance documents, launched a new educational Feed and Feed Ingredients webpage, hosted an educational webinar with FDA, and presented on the topic at the 2025 State of the Science Summit.

Prior to Fyto, Inc., receiving the grant, CFRP supported this research effort and educated Fyto, Inc., of the necessary steps to ensure feed and food safety and compliance with federal and state laws and regulations. Fyto, Inc., was informed that since the biomass was not an approved feed ingredient, they would need to obtain a Food Use Authorization (FUA) through FDA for safe investigational use. Such determinations regarding safety of meat and milk that crosses state lines is not under the authority of CDFA to permit. It is not described in the Final Report why Fyto, Inc., did not obtain a FUA; however, Pages 5 and 6, state: *"While over 1 million pounds of fresh lemna were grown and harvested from the operation, it was unable to be fed to the cows on the operation based on the CDFA Commercial Feed Regulatory Program's*

opinion that it was not a homegrown feed that would be exempt from a commercial permit. The Fyto team dried as much as possible, but the majority of the crop needed to be landfilled which was a very unfortunate outcome that frustrated Fyto, the host dairy, and many stakeholders that were looking to see the material used on-farm." CDFA OARS and CFRP agree this circumstance is unfortunate, and hope that future research projects using unapproved feed ingredients will proactively work to safeguard feed and food safety and follow all federally required processes, including obtaining an FDA FUA when appropriate.

Additionally, CFRP advised Fyto, Inc., in 2023 to work at the federal level through AAFCO and FDA for a pre-market approval of their proposed new feed ingredient, and CFRP provided contacts for Fyto, Inc., to begin the ingredient submission process. Pages 13 and 14 of the Fyto, Inc., Final Report states: *"In 2024, an independent panel of three subject-matter experts was assembled to assess the safety of Fyto's lemna as an ingredient for all animals. The dossier that the expert panel reviewed included dozens of laboratory tests as well as hundreds of journal article references compiled by Fyto's regulatory team. This was in support of Fyto's AAFCO ingredient definition application and subsequent FDA submission (once AAFCO/FDA MOU was terminated). The expert panel found that Fyto's ingredient was indeed safe for all animals if provided in accordance with good animal nutrition practices."*

All new feed ingredient submissions as of October 1, 2024, are under the Animal Food Ingredient Consultation (AFIC) process or Generally Recognized as Safe (GRAS) notification program, both of which are public inventories published by FDA:

i. https://www.fda.gov/animal-veterinary/animal-food-ingredient-consultation-afic/current-animal-food-ingredient-consultation-inventory
ii. https://www.fda.gov/animal-veterinary/generally-recognized-safe-gras-notification-program/current-animal-food-gras-notices-inventory

Inconsistent with the statements in this Final Report, to date, there is **no submission** in either inventory from Fyto, Inc., or any company, for dried water lentils, duckweed, Lemna minor, or any other similar ingredient. CFRP advised multiple times for Fyto, Inc., to complete the necessary steps to advance this nutrient-dense biomass through the federal feed ingredient approval process. We acknowledge it is a time-consuming process, yet necessary to safeguard feed and food safety and obtain legal marketing status federally.

Sincerely,

Jenna M. Leal, Chief
Feed, Fertilizer, Livestock Drugs Regulatory Services Branch
Inspection Services Division