

Scientific Opinion: Challenges for Animal-Free Milk Alternate Protein Based Ingredient and Products

Suresh Sutariya*

Agropur, Appleton, USA

***Corresponding Author:** Suresh Sutariya, Agropur, Appleton, USA.

Received: September 26, 2019; **Published:** October 16, 2019

Recently there has been a section of researchers and food start-ups are trying to formulate and promote animal-free ingredients based food products. Usual approach in producing animal-free milk alternate protein involves using a genetically modified organism. Creation of genetically modified organism involves altering the organism's genetic material using genetic engineering techniques. This genetic engineer techniques usually involved extracting the part of the DNA from the cow which is responsible for producing various types of milk proteins and inserting this extracted DNA section in to organisms (usually yeast) DNA. In this way the genetically altered organism can produce protein fractions (animal-free milk alternate proteins) similar to the one found in cow milk.

Usually genetic engineering techniques involve modifying organism to produce individual protein fractions (α_1 -casein, α_2 -casein, β -caseins and κ -casein) separately and they might not be produced in micellar form similar to one found in milk for casein. Milk casein micelles are made up of protein fractions such as α_1 -casein, α_2 -casein, β -caseins and κ -casein and calcium phosphate, which interacts with each other to exist in micellar form [1]. In such case it will be controversial to label such individual animal-free milk alternate protein fraction as casein protein on product label ingredient list if they do not exist in micelle form. Hence, individual animal-free milk alternate protein fractions produced by genetic engineering technique can be called fermentation produced κ - casein protein or fermentation produced β -casein protein or fermentation produced any other protein fraction (found similar in milk protein).

Whey proteins (milk serum proteins) are defined as proteins in milk that remain soluble after acid [2] or after rennet casein precipitation [3] and includes β -lactoglobulin (β -Lg), α -lactalbumin (α -La), bovine serum albumin (BSA), immunoglobulin (Ig), and lactoferrin (Lf). Here again it will be controversial to label individual animal-free whey protein fractions (β -Lg and α -La) produced by genetic engineering techniques as whey proteins, however they can be called as fermentation produced β -Lg and α -La. Also whey protein component such as BSA, Ig and Lf exist in very minor amount in whey and hence animal-free ingredient producers may not produce this minor component due to high cost of production. In such case animal-free milk alternate protein based product may not contain BSA, Ig and Lf and hence consumer might miss the nutritional benefit of such whey protein fractions.

There will be various challenges in labeling of the products made using animal-free protein fractions. As per CFR standard of identity for milk: Milk is the lacteal secretion, practically free from colostrum, obtained by the complete milking of one or more healthy cows [4]. Hence it will be challenging associating word "milk" with animal-free milk alternate protein on product label for example "animal-free milk protein". It will also be legally challenging calling milk alternate beverage made by using this animal-free milk alternate proteins as milk. Similarly, other products made using this animal-free dairy alternate protein cannot be legally called cheese, ice-cream, yoghurt etc. Also milk along with protein and fat provide various other nutrients such as vitamins, minerals and other micronutrients. Hence, the animal-free product most probably needs to be fortified with vitamins, minerals and other micronutrients.

There is a very strong emerging trend of consumer demand for Non-GMO and natural products. Usually consumer looking for environmental sustainability (animal-free milk alternate product claims environmental sustainability) might also be looking for Non-GMO and natural products. Hence, in such consumer base this animal-free milk alternate product will have a challenge on getting acceptance from the consumer who wants Non-GMO and natural products.

Cow protein can cause allergic reaction to some consumer and as a result it is required to declare its presence as "Milk" on allergen statement on any product containing cow milk or milk ingredients [5]. The animal-free milk alternate protein will have a structure similar to milk protein and hence it has a potential to cause similar allergenic reaction. Now the challenge here is how to declare it on allergen statement. Declaring this allergen as a milk might be legally controversial and declaring as an animal-free milk alternate protein may confuse consumer thinking this might not have allergy similar to milk. This challenge needs to be addressed to safeguard the consumer allergic to milk and milk products.

There will also be a challenge in mimicking the flavor and texture profile similar to dairy product and getting acceptance in wide consumer base.

The opinion here is of author's and does not represent any associated organizations.

Bibliography

1. Holt C., *et al.* "Invited review: Caseins and the casein micelle: Their biological functions, structures, and behavior in foods". *Journal of Dairy Science* 96.10 (2013): 6127-6146.
2. Walstra Pieter and Jenness Robert. "Dairy chemistry and physics". John Wiley & Sons (1984).
3. Barth CA and Behnke U. "[Nutritional physiology of whey and whey components]". *Nahrung* 41.1 (1997): 2-12.
4. CFR. "Code of Federal Regulations Title 21-Food and Drugs: chapter I-food and drug administration department of health and human services: subchapter b--food for human consumption: part 131-milk and cream" (2018).
5. FDA. "Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA), Public Law 108-282, Title II" (2018).

Volume 14 Issue 11 November 2019

©All rights reserved by Suresh Sutariya.