

Report

Enzyme Use in Plant-Based Meat Alternatives

Due to an imbalance in the supply and demand of protein caused by population growth, the world is currently facing a protein crisis. To overcome this issue and achieve a sustainable society, attention is being turned to the development of "plant-based meat alternatives" that recreate the delicious taste of meat using soybeans and other plant materials. The industry has seen remarkable technological innovations, but at the same time, food manufacturers must respond to the needs of clean-label-conscious consumers who call for the use of fewer food additives. Enzyme technology is being utilized to address the challenge of food additives and develop clean-label, high-quality plant-based meat alternatives. This section outlines a new technological approach developed by Amano Enzyme to address three technical challenges in the production of plant-based meat alternatives: Binding, color, and the off-flavor of soybeans.

First is about binding. Methylcellulose, a chemical binding agent, is used in plant-based meat alternatives. As such, a chemical-free binding solution is required. A new protein crosslinking

solution developed by Amano Enzyme uses a sugar beet pectin and laccase to improve the shape retention and binding properties of meat alternatives without chemical binding agents (Figure 1).

Next, to address the issue of recreating the browning process of real meat in meat alternatives during cooking, we developed a technology where laccase reacts with food coloring (beet red) to turn brown when cooked (Figure 2). This reproduces the same color variation as meat and improves the visual appeal of plant-based meat alternatives.

Finally, in order to reduce the unpleasant off-flavor of soybeans often found in plant-based meat alternatives, we have developed a technology that uses enzymes to reduce the volatility of the causative compounds. By developing plant-based meat alternatives with fewer off-flavors, the alternatives are expected to be more accepted by a broader consumer base.

Using these enzyme-based technologies, we are taking steps to improve the quality of plant-based meat alternatives and achieve a future with a sustainable food supply.

Figure 1 Proteins bound with laccase Shows plant protein binding in the same way as with methylcellulose

			
Methylcellulose	Without	With	Without
Laccase + Sugar beet pectin	Without	Without	With

Figure 2 Color change in meat alternative Shows browning of the color during the cooking process due to an enzymatic reaction

