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Analysis on Performance of Membrane Separation Process for Agricultural Products

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Membrane separation technology is a fine filtration technology which can separate molecules according to their molecular size. It requires low initial cost and small energy, while can keep the quality of products high, because it is a simple process which requires no heat treatment.

On the other hand, approximately 200,000 tons of egg-laying hens are discarded annually in Japan, because quality of their meat is low. However, chicken meat is rich in anserine and carnosine (AC) which are dipeptides having unique and strong antioxidant functionality.

If AC contained in the chicken meat can be purified with low cost using membrane separation technology, they can be promising components of a wide variety of functional foods.

In order to add extra value to the discarded hen-meat and utilize them, a membrane separation process which can efficiently purify AC extracted from the chicken meat was developed in this work.

At first, separation efficiency of 13 different kinds of nanofiltration membranes was evaluated, and four kinds of nanofiltration membranes were selected for separation of AC.

Then, by using these four kinds of nonofiltration membranes installed in a pilot scale membrane separation unit, AC contained in chicken extract was purified.

Based on these experimental results, a mathematical model which can express separation efficiency of a nanofiltration process for purification of AC was proposed, and an industrial scale membrane process which can produce 11.2 kg of purified AC from 5 tons of chicken carcasses in a day was designed by applying the model.

In Mongolia, a lot of dairy products such as cheese and butter are produced from milk with a lot of whey discarded during the process. However, whey contains valuable nutrients such as soluble protein, lactose, minerals and so on. By applying membrane separation technology, which the fellow currently handling on chickens, to the whey, value added products can be produced from the whey. The membrane separation technology will contribute to the improvement in nutritional condition of Mongolian people.