RAPESEED PROTEIN CONCENTRATE AND ITS USE IN MEAT PRODUCTS

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The nutritional and functional properties of rapeseed protein concentrate (RPC) have been evaluated together with its use in meat patties. The RPC was produced jointly by the Swedish companies, AB Karlshamns Oljefabriker and Alfa-Laval.

The PER value of rapeseed protein was comparable with meat protein. Functionally RPC was good in water and fat binding but inferior in stabilizing qualities. Organoleptically RPC was characterized and compared with soybean protein products in meat patties. It was found that the flavour of RPC was not as penetrating as the flavour of the soybean protein products. The problem with some "mushy" consistency in patties was overcome by texturizing the RPC.

Protéine concentrée de colza et son usage dans les produits de viande

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On a évalué les qualités alimentaires et fonctionneles de la protéine concentrée de colza (PCC) dans les boulettes de viande. La PCC est un produit commun de deux compagnies suédoises, AB Karlshamns Oljefabriker et Alfa-Laval AB.

Le coefficient d'efficacité protéigue (PER) de la protéine de colza est comparable avec celui de la viande. On a constaté un bon liage avec l'eau et la matière grasse mais une stabilité inférieure. On a étudié organoleptiquement et comparé les qualités caractéristiques de la PCC avec celles des produits protéiques de soya dans les boulettes de viande. On a constaté que l'odeur de la PCC n'est pas aussi pénétrante que celle de la protéine de soya. Le problème de la consistance pulpeuse a été resolu par l'application de la PCC texturizée.

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Rapsproteinkonzentrat und seine Anwendung in den Fleischwaren

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Die Ernährungs- und Funktionseigenschaften des Rapsproteinkonzentrates (RPK) und seine Anwendung in Karbonaden wurden ausgewertet. Das RPK ist in der Zusammenarbeit von zwei schwedischen Gesellschaften, AB Karlshamns Oljefabriker und Alfa-Laval AB, erzeugt.

Das Proteinwirkungsverhältniss (PER) des Rapsproteins ist mit dem des Fleischproteins vergleichbar. Das Bindungsvermögen des RPK mit Wasser und Fett ist gut, das Stabilisationsvermögen ist jedoch nicht gleich befriedigend. Das RPK vurde organoleptisch charakterisiert und in den Karbonaden mit den Sojaproteinprodukten vergleicht. Es wurde festgestellt, dass das Aroma von RPK nicht so deutlich wie das Aroma der Sojaproteinprodukten hervortritt. Das Problem der leicht breiartigen Konsistenz in den Karbonaden wurde durch die Anwendung des texturisierten RPK verbessert.

ПРОТЕИНОВЫЙ КОНЦЕНТРАТ ИЗ СЕМЯН РАПСА И ЕГО УПОТРЕБЛЕНИЕ В МЯСНЫХ ПРОДУКТАХ.

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Пищевые и функциональные свойства протаинового концентрата из рапса /ПКР/ были оценены при его употреблении в мясных блюдах на способ рубленных котлеток. ПКР был выработан шведскими компанями AB Karlshamns Oljefabriker и Alfa-Laval AB.

Степень использовования рапсового протеина (protein efficiency ratio - PER) была сравнима с мясовым протеином. Функционно, ПКР был хорош при соединении воды с жиром но его стабилизирующия свойства были хуже. Органолептически был ПКР характеризирован и сравнен с продуктами из соевого протеина в рубленых котлетках, причем нашли что аромат ПКР не был так проникающи как аромат продуктов соявого протеина. Проблема иза немножко кашовой консистенции была отстранена употреблением текстурованного ПКР.

RAPESEED PROTEIN AND ITS USE IN MEAT PRODUCTS

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Karlshamns Oljefabriker has, in co-operation with Alfa-Laval, developed a process for the production of rapeseed protein concentrate (RPC). During the process the hulls, oil and water soluble non-proteinous components are removed from the rapeseed. The water soluble fraction contains various sulphurous compounds, glucosinolates, which are split by the enzyme myrosinase in the precense of water to antinutritional substances i.e. isothiocyanates, oxazolidinethiones and nitriles. In our process the enzyme myrosinase is first inactivated and then the glucosinolates leached out.

The composition of RPC is 61% crude protein, 2% fat, 7% moisture, 8% fiber, 7.5% ash and the remainder carbohydrates. The nutritional quality of the protein is very good, being the best of vegetable proteins known so far and comparable to animal proteins. RPC contains all the essential amino acids in larger amounts than required by the FAO/WHO scoring pattern (Anon., 1973). The PER-value (Protein Efficiency Ratio) for RPC is 3.0, 2.5 for caseinate and 3.2 for meat. The NPU (Net Protein Utilization) for RPC is 78, the same as for caseinate.

In spite of the high nutritional value, RPC cannot be used as a food ingredient unless it will function in food systems. The functionality was evaluated in our laboratory by measuring the organoleptic quality, uptake of water and fat, solubility, gel building, emulsion stability, foam volume and foam stability. These evaluations were made on RPC in comparison with soybean protein products. These comparisons were also made for the function of RPC in meat systems (meat patties, sausages etc.).

Because of the heat treatment during the production of RPC the proteins are denaturated, and thus the protein solubility of RPC is low and the emulsifying characteristics poor. The gel building and the foaming properties are also inferior . Organoleptic quality and the uptake of water and fat are however very good and are discussed in more detail.

Uptake of water (swelling) was measured with a Baumann-apparatus (Baumann 1967). RPC was compared with texturized soya flour, soya protein concentrate and soya protein isolate. The amount of water taken up was about twice that of textured soya flour and soya protein concentrate and equal to soya protein isolate. When mixed in meat patties the relationship was unchanged. The uptake of water in RPC was about four times its weight, while the water uptake of textured soya flour and soya protein concentrate in the patties was only twice their weight.

Uptake of fat was analysed by measuring the difference in the amount of fat before and after deep fat frying of meat patties with RPC or with textured soya flour as reference. Bread crumbs and potato flour were used as binding agents together with RPC or textured soya flour in the meat patties. Control patties were made without RPC or soya protein. In the finished product the total amount of fat was highest in the control patties and lowest in the patties with textured soya flour, although the change in the amount of fat during deep fat frying was less in control patties, higher in patties with textured soya flour and highest in patties with RPC.

In order to be able to find out whether fat was taken up or lost during the deep fat frying the patties were fried either in rapeseed oil or in coconut oil. These oils were chosen because they have different fatty acid compositions from that of meat. Fatty acid analysis was made on the oil before frying and on the patties before and after frying. The analyses of the fatty acid compositions showed that the control batter released a considerable amount of the original fat and at the same time took up a lot. The net balance was negative, i.e. more fat was released than taken up. Batter with texturized soya flour released about half the amount released by the control, and took up some more, however less than the control batter. Net balance was positive i.e. more fat was taken up than released. Batter with RPC released somewhat less than textured soya flour but took up most, more than the control batter. Net balance was strongly positive i.e. many times more fat was taken up than released.

The frying loss was measured in patties with RPC, textured soya flour or soya protein concentrate. Patties with RPC had the lowest frying loss and the control patties the highest.

The flavour of RPC was characterized in comparison with soya protein products by a taste panel with 8 members. RPC was stronger in flavour than textured soya flour and soya protein concentrate. The flavour were characterized as sulphurous, bitter and a little musty, while the flavour of e.g. textured soya flour was cereal-like and sweet. However in meat patties the flavour of RPC was not as penetrating as the flavour of textured soya flour. This result was confirmed by a panel of 35 consumers, who had never tasted RPC in any form. The panel prefered the patty with RPC over a commercial patty although that contained more meat.

We were however not satisfied with the consistency of the patties; they were somewhat "mushy" (soft and poorly bound). In order to overcome this RPC was texturized by extruding. This texturized RPC had a much better bite than the texturized soya flours but the uptake of water was inferior when compared to the original material. The water uptake was the same as for textured soya flours. All the mushiness in the meat patties was overcome.

Our work with the process development and evaluation of RPC is continuing, and our opinion is that RPC will be a very promising food ingredient in the near future because of its nutritional value, mild flavour in meat products and good water and fat binding properties. RPC will be mainly used in the textured form as e.g. meat extender.

References

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