Utilisation of coconut milk residue for fibre enrichment in foods

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Milk residue is the solid material left behind when coconut milk is extracted from grated or shredded coconut kernel. It is generated as a by-product of processing of coconut milk based products like coconut milk, coconut milk powder, flavored coconut milk, coconut milk yogurt, VCO etc. This residue represents approximately 25–50% of the weight of the grated kernel on a wet basis, depending on the coconut milk extraction process that is used. Now a days, residue left after processing of coconut milk based products is utilized for the preparation of bakery or confectionary items. However, this residue posses good nutritional property which could be utilized for value addition of various food products.

Studies done at the Philippine Food and Nutrition Research Institute (FNRI) reveal that coconut residue has a much higher dietary fibre content (32%) than oatmeal (8%) and flax seed (23%), which are being promoted by American food companies as healthy foods. Based on FNRI analysis, dried coconut milk residue has the the composition of 51% carbohydrates, 32% dietary fibre, 38% fat, 5% protein, 4% moisture and 2% ash. Coconut milk residue can be used either dried or wet, depending on the application.

Coconut flour can be used as food supplement or additive in breads, cookies and snack food to enrich dietary fiber.

Preparation of coconut milk residue

Coconut milk residue after the extraction of coconut milk for various purposes is dried in an electric hot air oven upto a moisture content of less than 3%. Care should be taken to avoid colour change during the drying process. The residue is stirred in intervals so as to prevent browning.

Benefits of coconut flour

Coconut flour has proven to have high amounts of soluble and insoluble dietary fiber (49% - 60%) which is important in functional food development. (Based on the study made by PCA).

Test foods containing 15% - 25% dietary fiber from coconut flour reduces serum total and LDL cholesterol of humans with moderately raised serum cholesterol.

High-fiber coconut flour is used as food supplement/ additive in breads, cookies and snack food to provide dietary fiber sources. As a source of dietary fibre, coconut milk residue provides a number of health benefits in relation to coronary heart diseases, colon cancer and diabetes.

It has been reported that high fibre coconut flour products increased fecal bulk and lowered serum cholesterol. Coconut flour can also be used as fillers for emulsified products such as sausages, meat loaf and burger patties.

Properties of milk residue

Properties of milk residues left after the extraction of milk for products like virgin coconut oil, flavoured coconut milk coconut milk yogurt and coconut cream is as follows:

Physical properties	
Parameters	Characteristics of coconut flour
Colour	White/Off white
Odour	Slightly nutty odour
Taste	Bland taste
Particle size	Fine to medium
Shelf life	Min.6 months
Water absorption capacity	high

Chemical properties				
Parameters	Residue left after processing of:-			
	Flavoured coconut milk	Coco-nut milk yogurt	VCO	Coconut cream/ Thick coco-nut milk
Crude fibre(%)	6.63	7.89	8.63	5.4
Carbohydrates(%)	41.29	41.77	43.77	32.45
Protein(%)	3.79	3.21	1.44	3.61
Fat(%)	43.31	42.36	40.08	54.72
Total mineral matter (Total ash) (%)	1.79	1.52	0.84	1.4
(Source: CDB Institute of Technology)				

Value addition of coconut milk residue

Now a days there is an increase in the incidence of lifestyle diseases like obesity, diabetes mellitus, atherosclerosis etc. A practical solution for reducing the risk of these diseases is inclusion of fibre rich foods in our daily diet. More and more consumers are becoming health conscious. People are becoming more conscious on quality and nutritional contents.

Coconut milk residue can be used in making fibre-enriched foods and in the formulation of functional foods because of its high fibre content. It can be used as an ingredient and extender for home food preparations to enhance nutritional value. Coconut residue itself can be used as a major ingredient in some of the food products. Coconut flour or desiccated coconut used can be replaced by coconut milk residue.

Utilization of coconut milk residue in various food products for fibre enrichment

Fortification of coconut milk residue in products like bread, noodles etc will enhance the health benefits of these products. Specialty breads like high fiber white bread are on the rise. Todays consumers expect their foods to have multiple functional benefits. Still, they have high expectations when it comes to taste and flavor. For example formulating cereal based energy bars incorporating large amount of functional components like fibre and protein may be difficult, as these ingredients may impact the taste and flavor of the final products. Coconut residue has a bland taste and hence it does not detract from other flavours that may be added to snacks or other products to enhance their taste. Some of the food products in which fibre fortification was successfully done by incorporation of coconut milk residue are cookies, bread, rusk, noodles and energy bar. The recipes were prepared using 5-15% coconut milk residue.

Level of incorporation of coconut milk residue in different products

Type of product	% of coconut milk residue incorporated
Cookies	7 %
Bread/Rusk	12%
Noodles	6.5%
Energy bar	8%

Products prepared using coconut residue as major ingredient

Coconut milk residue can be used as a major ingredient for production of viable products which are of commercial importance. Products like instant theeyal mix, coconut chutney powder, coconut burfi and coconut ladoo were prepared either using coconut residue as the major ingredient or by partial substitution of coconut flour by coconut residue.

The health benefits of coconut residue if will create a market for high-protein coconut flour and encourage existing VCO, flavoured coconut milk and other coconut milk based products' producers to further process their by-products.

Type of product	% of coconut residue incorporated
Coconut chutney powder	40%
Theeyal mix	43%
Coconut Ladoo	40%
Coconut Burfi	30%
Coconut macroons	40%

Nutritional parameters of developed products					
Parameters	Carbohydrates (%)	Protein (%)	Fat (%)	Crude fibre (%)	Mineral matter (%)
Cookies	37.41	3.10	39.55	0.53	0.65
Bread	50.85	11.31	7.59	1.88	1.37
Rusk	76.4	7.21	8.32	0.58	0.92
Noodles	63.00	13.53	10.37	1.72	3.24
Energy bar	55.00	6.13	24.73	2.18	2.42
Coconut chutney powder	11.59	3.39	54.08	1.88	4.69
Theeyal mix	9.88	2.95	65.44	2.57	2.41