

Herstellung von zerkleinerten Fleischwaren

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Durch Versuche mit jeweils 10-15 kg Material ist bewiesen worden, daß es möglich ist, Würste von guter Qualität aus verhältnismäßig kleinen Mengen von fettarmem Fleisch, pflanzlichen Füllungen, und Erdnußproteinisolaten herzustellen. Man hat die Geschmacks- und Gewürzprofile von beliebten einheimischen Fleischgerichten, die Verarbeitungsparameter und die mikrobiologische Qualität, als auch die Angaben der Maschinen, die zur Zerkleinerung von Fleisch notwendig sind in Einzelheiten studiert. Solche zerkleinerte Fleischwaren können durch verschiedene Formen, Größen und Geschmacksprofile dem Konsumenten ansprechend gemacht werden.

Production of Comminuted Meat Products

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The feasibility of preparing good quality sausages on bench scale trials of 10-15kg using a lower proportion of lean meat admixed with vegetable fillers and peanut protein isolates has been worked out. The machines required to disintegrate meat to suitable fineness, taste and spice profiles of popular indigenous meat dishes, processing parameters, microbiological quality etc. have been studied in details. These comminuted meat products can be engineered to different shapes, size, taste and ^{flavour} profiles appealing to consumers.

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Production des Produits de la Viande Brozée

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Au moyen des expériences avec 10-15 kg du matériel, on a démontré la possibilité de produire les saucisses de bonne qualité en utilisant une quantité relativement moindre de la viande maigre en combinaison avec du matériel de remplissage végétal, et le protéine isolé d'arachide. On a étudié, en particulier, la qualité microbiologique et organoleptique, les épices qui sont ajoutés aux mets (viande) indigènes, populaires, les paramètres du procédé, ainsi que les stipulations pour les machines broyantes. Les produits de la viande pulvérisée peuvent être fabriqués avec des formes des dimensions, et des goûts séduisants.

PRODUCTION OF COMMINUTED MEAT PRODUCTS

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Introduction:

More than 60% of the total meat production in India comprises of meat from sheep & goat. Processed meat products form a very small proportion of the total meat production.¹ This state of affairs points out the immense scope for development of processed meat products; ~~from~~ ~~a~~ ~~very~~ sausages constitute about 20% of the total processed meat products manufactured.²

In Western countries a significant proportion of meat production is converted to comminuted meat products, particularly sausages³ because the processing of meat into sausages or comminuted products is an efficient and economical method of utilizing available meat. Comminuted type of products have the advantage of incorporating taste and flavour profiles similar to the popular Indian meat curries.

Comminuted meat products are prepared out of trims in countries where these are available as a by-product of the meat cutting industry. In India the meat is sold in butcher shops after cutting the carcass according to the choice of the customer in his presence. Therefore trims are not available for processing. Under these circumstances, entrepreneurs have to use meat obtained by deboning a whole carcass for preparation of comminuted meats. This confers a qualitative advantage of better emulsifying capacity. The proportion of meat in the formulation could be reduced to 43-46% without sacrificing the firmness of the sausage as against the usual 60-65% meat as trims in a typical frankfurter formulation. With this basic understanding of the formulation, sausages incorporating different spice profiles of Indian meat curries were developed from mutton. Results of acceptability trials processing conditions are reported in this paper. Since the shape of sausages is not familiar to a large section of our population, the emulsion was also processed in the form of loaves.

Materials & Methods:

The raw materials like mutton carcasses, vegetables, green curry stuff and spices were obtained from the local market. Lean, bone and fat were separated from the carcasses and cut into chunks (2"). Vegetables were cleaned and cooked at 15 lbs. steam pressure for 30 mins. Green curry stuff was cleaned. Spices were cleaned and powdered. The ingredient composition of the formulation is given in Table 1.

The emulsion was prepared in a bowl chopper as reported in the earlier work.⁴ Batch sizes of 15, 25 and 50 kg were prepared. The emulsion was filled into natural sausage casings (16-18mm) or rectangular moulds (3.5-5 kg). Cooking was carried out to a centre temperature of 68-70°C. The sausages were cooked by suspending over

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simmering water in a chamber while moulds were immersed in simmering water. The cooked sausages/loaves were cooled. The sausages/sliced loaves were packed in polythene bags and stored at refrigerated (0-2°C) & frozen (-10°C) temperature.

Proximate composition was determined according to A.O.A.C.⁵ methods.

Bacteriological evaluation was carried out for total counts, coli, coagulase positive staphylococci and salmonella, according to methods of A.P.H.A. in initial as well as stored samples.⁶ Texture was evaluated by Warner-Bratzler shear press. The standard triangular cutting blade was used in the case of sausage and a similar $\frac{1}{4}$ " thick blade of perspex sheet in the case of loaf.

Acceptability was tested by organoleptic evaluation of the sausages, roasted on a flat pan smeared with edible oil, by offering to a panel of judges drawn from the staff of Institute. Sizeable quantity of the products were sold through commercial and cooperative outlets.

Results & Discussion:

To obtain the desired firmness and keep the processing loss to 5-7% in sausages and 1-2% in loaf, it was essential to maintain the proportion of lean meat, fat, binder, salt and chemicals as specified in Table 1. The proportion of vegetables onion, green curry stuff and spices could be varied to obtain the desired taste and flavour profiles. The typical chemical composition and firmness of the products is given in Table II. The variation from batch to batch is small showing thereby the reproducibility of the process.

The results of bacteriological examination given in Table III showed that the total count, coli and coagulase positive staphylococci are very similar to those suggested by Goldenberg & Elliot⁷ but the counts in the cooked product are far lower than those recommended by Powers.⁸ These results show that the cooking process has been adequate. The total counts in the product stored at refrigerated temperature (0-2°C) were 2.9×10^5 on the 13th day, but this was lowered to 3×10^2 on pan roasting. Similar observation has been reported by Kotwala et al.⁹ in beef patties. The product was acceptable upto 2 weeks at 0-2°C and 6-7 weeks at -10°C. The results of the organoleptic evaluation (Table IV) showed the products were acceptable and the batch to batch variation was in a narrow range. Sale through two departmental stores in two metropolitan cities indicated that customers who did not use to purchase sausages, purchased this product when they came to know that it is made out of mutton and has local taste profile.

The cost of production per kg. of mutton sausage and loaf works out to Rs.16.11 and Rs.15.05 respectively (Table V). This is about 50% higher than the cost of mutton carcass (Rs.10/kg).

Summary:

A process for the manufacture of sausages and loaf from mutton with acceptable flavour and taste profile has been developed. Chemical analysis, bacteriological status, organoleptic evaluation have been reported. The cost of production was Rs.16.11 and 15.05 per kg of sausage and loaf respectively.

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Table I: Ingredient Composition

<u>Constituent</u>	<u>Percentage</u>
Lean meat	50 %
Fat	15
Vegetables (Tomato, Carrots)	12.5
Onion	10
Green curry stuff (ginger, garlic coriander, green chillies)	4
Binder	5
Salt	2
Chemicals (No ₂ , No ₃ , Tripolyphosphate)	0.5
Spices	1.0

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Table II: Percentage chemical composition and firmness of sausage/loaf

Moisture	65(60-67)
Protein(Nx6.25)	15(13-16.9)
Fat	15(13-18)
Minerals	2.6 (2.4 -2.8)
Chloride (as NaCl)	1.5 (1.3 - 4.0)
Firmness* (WB shear values in lbs/cm)**	3.14(2.2 - 4.0) 4.10(2.51-6.8)

* Shear value for sausage

** " " " " Loaf

Table III: Bacteriological status of the finished products

Counts/g	Emulsion	Finished product
Total count	0.9 - 1.2x10 ⁶	280-2300
Coliforms	500 - 7200	nil
Staphylococci (coagulase +)	300 -1000	nil
Salmonella	nil	nil

Table IV: Organoleptic evaluation of different batches(hedonic scale 1 - 8)

Batch	color	flavour	firmness
1	5.8	7.0	6.2
2	6.1	5.8	6.8
3	5.9	6.6	6.3
4	4.3	7.3	6.5
5	4.0	6.4	5.6
6	6.2	6.8	6.2
7	7.2	5.9	6.2
8	6.1	6.8	6.8

Number of judges for each tasting were 15 to 25.

Table V: Production cost of the product (based on 50 kg)

Raw material	Rs.644.20
Processing(Labour, services, packaging)	37.50
Fluctuation in raw materials	65.00
	Rs. 746.70
Yield	
Sausage	47.3 kg
Loaf	49.6 kg
Cost per kg:	
Sausage	Rs.16.11
Loaf	15.05