

ABSTRACT

Physicochemical Changes Occurring on Extrusion
Processing of Cassava

Neela Badrie

The objectives of the research were to investigate the physicochemical changes in cassava extrudate by variation of extrusion variables and feed ingredients. The extrusion variables examined were feed moisture, temperature, screw speed and feed rate on a Wenger X-5 laboratory, single-screw extruder. The main feed ingredients were cassava flour and cassava starch from *Manihot esculenta*, Crantz. Other feed ingredients were amylose, amylopectin, soyabean flour, soyabean oil and wheat bran. The physicochemical extrudate characteristics were expansion, bulk density, extrudate moisture, texture, colour, water absorption, water solubility and chemical composition.

Processing ranges of feed moisture: 11-16% d.b., temperature: 100-125°C, screw speed: 425-560 rpm and feed rate: 200-300 g/min with feed particle size 0.25 - 0.84 mm were selected to investigate the significance of each extrusion variable and the interaction between extrusion variables on each extrudate characteristic. Optimum expansion was obtained at 11 per cent feed moisture, temperature: 120-125°C, screw speed/feed rate: 520 rpm/250 g/min.

The effect of feed moisture was most significant on expansion, bulk density, extrudate moisture and cohesiveness. Increasing temperature resulted in increased expansion, water solubility, total reducing sugars and decreased bulk density, extrudate moisture, water absorption and texture (hardness, cohesiveness and fracturability). Screw speed was most influential on water absorption, water solubility and on textural parameters of hardness, firmness and fracturability. Feed rate showed greatest significance on textural parameters of springiness, gumminess and chewiness. Variation in feed ingredients produced compositional changes which influenced product characteristics.

Scanning electron microscopy showed distinct microstructural changes which were highly correlated to extrudate characteristics. Variations in the profile of texture force-deformation curves were related to extrusion variables and feed ingredients. Significant correlations between extrudate characteristics were obtained on varying processing conditions and feed ingredients.