P-221: Feed moisture influences the pasting and viscoelastic properties of pre-gelatinized pearl millet flours

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Feed moisture influences the pasting and viscoelastic properties of pre-gelatinized pearl millet flours

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Abstract

Millet is commonly consumed as thin or thick porridges in many parts of Africa, because it is adaptable to semi-arid agro-ecological zones and is readily available and affordable. We have introduced and used low-cost extrusion technology in Kenya, Senegal, and Niger to produce instant millet, sorghum, and maize porridge flours. A continuous single screw extruder, developed by engineers at Purdue, has been used to provide a variety of convenient instant products comparable in quality or better to conventional flours. Understanding changes in components in instant millet flours during extrusion is necessary to select appropriate conditions that can be used to create competitive flours at reasonable cost to consumers in Africa. In this regard, we processed whole grain pearl millet at different feed moisture contents (27, 29, 31, 33 and 35%) and assessed pasting profiles and viscoelastic properties of the instant flours. Lower moisture contents are desirable as extrudates require less drying energy and time. Examination of the instant flours using differential scanning calorimetry showed their complete gelatinization. Feed moisture of 35% resulted into highest extrudate moisture content before drying compared to flours extrudated at 27% moisture conditions ($p \leq .05$). Our results from Rapid Visco-Analyzer (RVA) showed that 35% feed moisture resulted in highest peak, trough, and final and set back viscosities compared to non-instant flours ($p \leq .05$). Moreover, the instant flours had greater storage modulus than loss modulus suggesting that single screw extrusion produces viscoelastic instant flours with stronger gels, especially at higher feed moisture. Electron micrographs suggested that higher moisture conditions allowed for greater starch expansion during extrusion. Overall, we observed that we could lower feed moisture to 31%, and produce extrudates with good pasting profiles comparable to 35% feed moisture, and that took less time and energy to dry, thus reduce on the energy cost involved in drying and processing instants flours.

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