IDENTIFICATION OF SUITABLE SPRAY DRYER AND FLUID BED DRYER INLET TEMPERATURE FOR STANDARD MILK POWDER IN MILCO (HIGHLAND) SPRAY DRIED MILK FACTORY, AMBEWELA.

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ABSTRACT

Ambewela MILCO (Highland) Spray Dried Milk Factory is the only factory which Produces milk powder under the brand name of "Highland Milk Powder" among five factories belongs to MILCO Company (Government). Raw milk, which is collected from different part of the country, transported to Ambewela MILCO Factory to produce full cream milk powder with highest quality. Ambewela MILCO (Highland) Spray Dried Milk Factory was upgraded their milk powder production capacity recently. According to the quality standards govern for the MILCO factory, moisture content of the final milk powder can hold up to 3.00%. Moisture Percentage of the milk powder plays an important role to the quality aspects of milk powder as well as economic aspects. Newly upgraded powder plant produces milk powder with moisture percentage under 2.75%.

Factors such as Spray Drying Temperatures, Fluid Bed Drying Temperatures, Flow Rate, and Milk Concentrate are influencing the final moisture percentage of milk powder. Spray Drying Inlet temperature and Fluid Bed Dryer Inlet Temperatures are the main variables that can be controlled in the main process of milk powder production in Ambewela MILCO (Highland) Spray Dried Milk Factory. Therefore, a study was conducted to find out the possible temperature ranges of both Spray Drying Inlet and Fluid Bed Dryer Inlet in order to select the most suitable temperature range which produces good quality milk powder with acceptable bulk density value ($0.56 kg/m^3$), scorched particles grade ("A" grade) and moisture content value closer to the 3.00 %.

A trial experiment was conducted to find out the suitable temperature ratio of both Spray Drying Inlet temperature and Fluid Bed Dryer Inlet Temperatures by considering bulk density, scorched particles and moisture content. Possible Spray Dryer Inlet temperatures were 175°C, 176°C, 177°C, 178°C, 179°C, 180°C and 181°C. Possible Fluid Bed Inlet Temperatures were 55°C, 60°C, 65°C, 70°C, 75°C, and 80°C. Raw milk was selected for milk powder production based on the quality parameters such as Keeping Quality, Hydrogen Peroxide, Alcohol, Acidity, Clots on Boiling, Lactometer, Fat level, S.N.F, Organoleptic Qualities by laboratory tests. Fat standardization was also done for raw milk. Final Spray Dryer Inlet temperatures were selected based on the scorched particles grade. Temperature higher than 179°C produced scorched particles of "B" Grade and from 175°C to 179°C inlet temperatures were produced scorched particles of "A" Grade. Fluid Bed Dryer Temperatures from 55°C to 75°C were selected based on the bulk density and moisture reduction.

Based on the above trial experiment, following Spray Dyer Inlet and Fluid Bed Dryer Inlet temperature combinations were selected as treatments. T_1 – SPI: 175°C, FBD: 75°C, T_2 – SDI: 176°C, FBD: 70°C, T_3 – SDI: 177°C, FBD: 65°C, T_4 – SDI: 178°C, FBD: 60°C, T_5 – SDI: 179°C, FBD: 55°C. Selected temperature ratios of these treatments were provided to the system and final moisture content, bulk density, scorched particles level and fat levels were taken into consideration for the quality parameters of milk powder. Fat level of the final milk powder indicated that there was no any significant difference ($p>0.05$) between treatments. Spray Dryer Inlet Temperatures of 177°C, 178°C and Fluid Bed Dryer Inlet Temperatures of 65°C, 60°C (T_3 and T_4) produced acceptable bulk density levels and moisture content levels of 0.562 kg/m^3, 0.556 kg/m^3 and 2.895%, 2.911% respectively. There was no any significant difference ($p>0.05$) between treatments.

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