EVAPORATOR FOULING TENDENCIES OF THIN STILLAGE FROM THE DRY GRIND PROCESS

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Evaporator fouling decreases heat transfer rates, causes pressure losses and an overall loss of product quality from inefficient solvent separation. Fouled evaporators decrease plant operating efficiency and require frequent cleaning which results in production downtime. Maintenance costs increase from evaporator cleaning, chemical detergents and sanitizers. In a corn dry grind plant, thin stillage is concentrated in multiple effect evaporators and mixed with wet grains to produce distillers dried grains with solubles which is used in animal diets. During thin stillage concentration, fouling occurs on evaporator surfaces due to deposit formation from thin stillage components. Thin stillage is composed of carbohydrates, proteins, fat and fiber.

Research on evaporator fouling in corn processing has been limited. Early work on thin stillage fouling has not determined the components of thin stillage that accelerate fouling. Unpublished work from our group showed that shorter chain carbohydrates such as corn syrup solids and glucose did not cause fouling but a longer chain glucose polymer, starch, had higher fouling rates. In addition to carbohydrates, other components of thin stillage could accelerate fouling. The objectives of this study were to investigate fouling rates of model thin stillage prepared with corn carbohydrates, ash and protein. Thin stillage was collected from each effect of a multiple effect evaporator to understand effects of total solids content on fouling rates. As thin stillage was concentrated, increased solids content may increase fouling rates. Deposits formed from thin stillage collected from each effect were analyzed for protein, fat, fiber and carbohydrate content to determine whether increased total solids contents will cause selective deposition of a specific component of thin stillage on evaporator surfaces. Oil separation from the last effects of a multiple effect evaporator generates revenue but it is not known how oil removal affects evaporator fouling. Fouling characteristics of skimmed and unskimmed thin stillage will be reported.