Forced air ventilation of sugar beet storage piles – observations and experiences in Alberta

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Forced-air ventilation was first utilized in 1990 at Rogers Sugar Ltd to improve long-term sugar beet storage. In that first year, visual observations of the storage piles and improvements in factory processing efficiency indicated that forced-air ventilation provided a definite improvement in sugar beet quality. Since 1990, various attempts have been made to accurately quantify the benefits of improved sugar beet quality and to determine if forced-air ventilation is a profitable venture. Rogers Sugar Ltd has made improvements and design changes to the ventilation system and currently ventilates up to 10% of the sugar beet crop, depending on crop size and campaign length. This presentation will discuss the methods used to determine the cost: benefit analysis of forced air ventilation and will explain the forced-air ventilation system at Rogers Sugar Ltd.

Forced-air ventilation circulates cool ambient air into the sugar beet piles by a system of perforated culverts and fans. The fans only operate when ambient conditions are between 34 and 41 F. Freezing sugar beet piles for long term storage, as is common in the Red River Valley, is not considered feasible in southern Alberta because of wide fluctuations in temperature during the storage season.

Respiration, the process of sugar beets metabolizing their sucrose for life support, can account for over half of total sucrose loss in storage. Respiration is highly dependent on temperature; therefore, controlling temperature is a key component of reducing storage sugar losses. Restricted air circulation in a pile limits oxygen supply and can cause beets to die. This leads to the development of hot spots in storage piles, resulting in beet spoilage and increased respiration in beets surrounding hot spots. Forced-air ventilation cools beets rapidly after harvest and maintains a consistent and cool pile temperature for the duration of storage, thereby reducing respiration, slowing microbial activity and reducing the development of hot spots.