REDUCING ENERGY USE IN PRUNE DEHYDRATORS THROUGH INCREASED DRYING AIR RECIRCULATION

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A set of 36 identical, parallel flow, asbestos-concrete prune dehydrating tunnels was used to test the effect of increased air recirculation on energy use. Half of the tunnels were left in standard operating condition, the other half were modified by placing doors on the cooler temperature end. The doors had a 16-in. high opening across the entire botton end to allow some moist air to escape. Turbine gas meters, pressure gages and temperature sensors were installed to measure the gas use of each of the halves.

During eighteen days of operation the tunnels with doors consumed 15% less natural gas than the standard tunnels. The recirculation increased the humidity in the tunnels, as measured by wet bulb temperature, from 114°F to between 122°F and 129°F. The increased level of humidity had no detectable effect on dried fruit moisture or total drying times.

At the highest wet bulb temperatures the burners in some tunnels would not stay lighted. Presumably the problem was caused by low oxygen levels in the recirculating air. This problem was solved in one unit by installing an air duct which provided fresh unheated air to the back of the burner. Tunnels with burners located very close to the fresh air doors will probably not experience this problem.

Because of the burner problems we were not able to determine the level of recirculation which would produce humidities high enough to affect drying rates. However, the one unit with the air duct operated at a wet bulb temperature of about 140°F for 5 days without any flame-out problems and with no perceptible effect on drying times or dried fruit moisture. Although we could not measure it, this tunnel theoretically should have used less gas than the tunnels operating at 125°F.

At last season's gas prices the doors resulted in about $700 less gas use per burner during the 18-day test. This savings should pay for the cost of installing the doors in less than one season of operation.