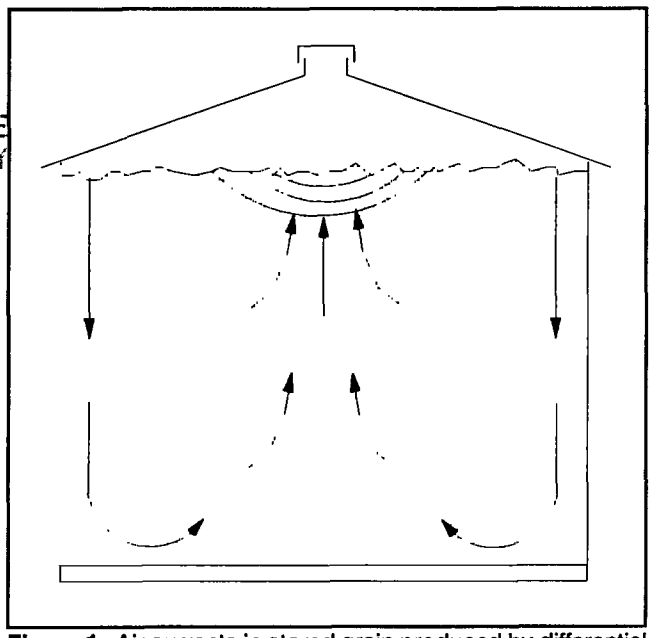

Figure 1. Air currents in stored grain produced by differential cooling.

air rises through the top layer of cooler grain, the air is cooled, loses some of its water-holding capacity, and moisture condenses on the grain.

Also, as air from the center continues to rise to the underside of the bin roof, further condensation occurs if the roof surface is cool. Thus, water accumulates in the top layer of grain because of these air currents moving through the grain, although the bin is weather tight. The moisture accumulation in the top layers of grain produces spoilage. For additional information on moisture migration refer to Extension publication Circular 1045, *Moisture Migration in Stored Grains*.

AIR FLOW REQUIREMENTS

Adequate air must reach all areas of the stored grain to cool it before condensation begins. Satisfactory aeration depends primarily upon air flow rate. The air flow rate through the grain will not be uniform where ducts are used. Thus, the air flow rate is an average value, and must be high enough for adequate air supply to reach the grain in all areas of storage.

Air distribution usually is more uniform in upright bins than in flat storage. For this reason, higher air flows are recommended for flat storage bins. For additional information on the design of flat storage aeration, refer to Extension publication Circular 861, *AERATE: Aeration System Design Software for Flat Grain Storages*.

Recommended air flow rates for intermittent operation in the Southeast are as follows:

upright storage - 1/10 to 1/20 cubic feet minute (cfm) per bushel (bu)

flat storage - 1/5 to 1/10 cfm per bu

Lower rates should not be used unless moisture content is less than 12 percent (wet basis).

Horsepower requirements and static pressure in inches of water for aeration fan operation are shown in Table 1. The table is valid only for clean grain without excessive fines or chaff.

To aerate 5,000 bushels of wheat stored at a depth of 15 feet with an air flow rate of 1/10 cfm per bushel, Table 1 can be used to determine that the horsepower (hp) required to drive the fan is 5 x 0.04 = 0.2 hp, or less than 1/4 hp. The air flow is 500 cfm and the static pressure against the fan is 1.25 inches.

AIR FLOW DIRECTION

Normally, air should be drawn downward through stored grain to counteract the tendency of the warm air to rise. Some condensation may occur when warm, moist air rises through a cooler top layer. Moving the air downward cools the upper layers of grain first and reduces the possibility of moisture migration.

If heat is trapped above the grain in partially filled bins, the downward motion of air can raise the grain temperature, which is undesirable. Under this condition, open the bin top and allow the hot air to rise before aeration begins.

It may be necessary to reverse the air flow in grain containing fines which accumulate near perforated ducts and block air movement. If the air flow rate is high, the direction of air flow is not critical. Therefore, it is normally not necessary to reverse the direction of rotation of a drying fan used for aeration.