

HEAT STRESS CAUSES THIN- SHELLED EGGS

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There are two important buffering systems in the body that maintain body fluids at near neutral pH. One is based on phosphate and the other on bicarbonate. The latter system is utilized in a clever way by birds to form eggshells.

The origin of bicarbonate (HCO₃⁻) is from carbon dioxide (CO₂), which arises as a consequence of metabolism of sugar, mainly glucose. Glucose, which is

derived from complex carbohydrates in the diet, is broken down to release energy for metabolism. Carbon dioxide is also formed as a consequence of glucose breakdown.

Carbon dioxide is of course a gas, but gas doesn't build up in tissues. Instead, CO₂ is converted into bicarbonate which dissolves into the body fluids. Within the lungs CO₂ reforms and is exhaled as a gas.

In the shell gland where the eggshell is made, bicarbonate is converted into carbonate (CO₃²⁻), and this substance is secreted along with calcium ions (Ca⁺⁺) onto the shell membranes which cover the albumin, or egg white. The shell membrane catalyzes the precipitation of calcium carbonate

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crystals to form the eggshell. Bicarbonate, carbonate, and carbon dioxide exist in specific proportions and are readily interconverted. Consequently, changing the level of one will influence the concentration of the others in the body fluids.

Under normal circumstances, bicarbonate is maintained at the correct level in body fluid because the breathing rate is just right to remove CO₂ at the same rate as it forms within the body. Eggshell formation taps into this CO₂/bicarbonate/carbonate buffering system. Changing the composition of the buffering system can profoundly affect eggshell formation. For example, if hens are subjected to heat stress, they will attempt to cool down by panting. CO₂ will be exhaled at a more rapid rate than it is being produced. As a consequence, total body CO₂ is decreased and eggshells become thin and fragile.

vation District is administering the Pennsylvania Agricultural Non-Point Source Pollution Abatement Program's Financial Assistance Program in the Chester County portions of the Octoraro Creek and Elk Creek watersheds.

The sign-up period for this program is March 13 through April 10. Landowner participation in this program is on a voluntary basis.

The financial assistance program is a cost-sharing program to help landowners with the expense of controlling critical agricultural nutrient and erosion problems by installing nutrient management and conservation practices on their farms during a period of one to three years. The maximum cost-share rates available are eighty percent (80 percent) of the costs for certain practices and are not to exceed \$30,000 per landowner.

The ultimate goal of the program is to reduce the amount of nitrogen, phosphorous, and sediment entering the Chesapeake Bay through its many tributaries, as agricultural runoff was determined

as a contributing source of those nutrients and sediment. However, local benefits will also be realized, from elimination of gullies in fields and more complete utilization of nutrients on the farm, to increased quality of local streams and reduced risk of contamination of our groundwater.

Some of the basic eligibility requirements for the financial assistance program are as follows:

- Must be a landowner in the Chester County portions of the Octoraro Creek or Elk Creek Watersheds.

- Must have a critical nutrient and/or soil erosion problem(s) on the farm in these Watersheds.

- Must be a "cooperator" with the Chester County Conservation District. (If not, please request an application form from the district.)

- Must be willing to enter into a one to three year agreement designed to solve the critical nutrient and/or soil erosion problems in the farm and maintain the agreed upon practices for a 10-year period.

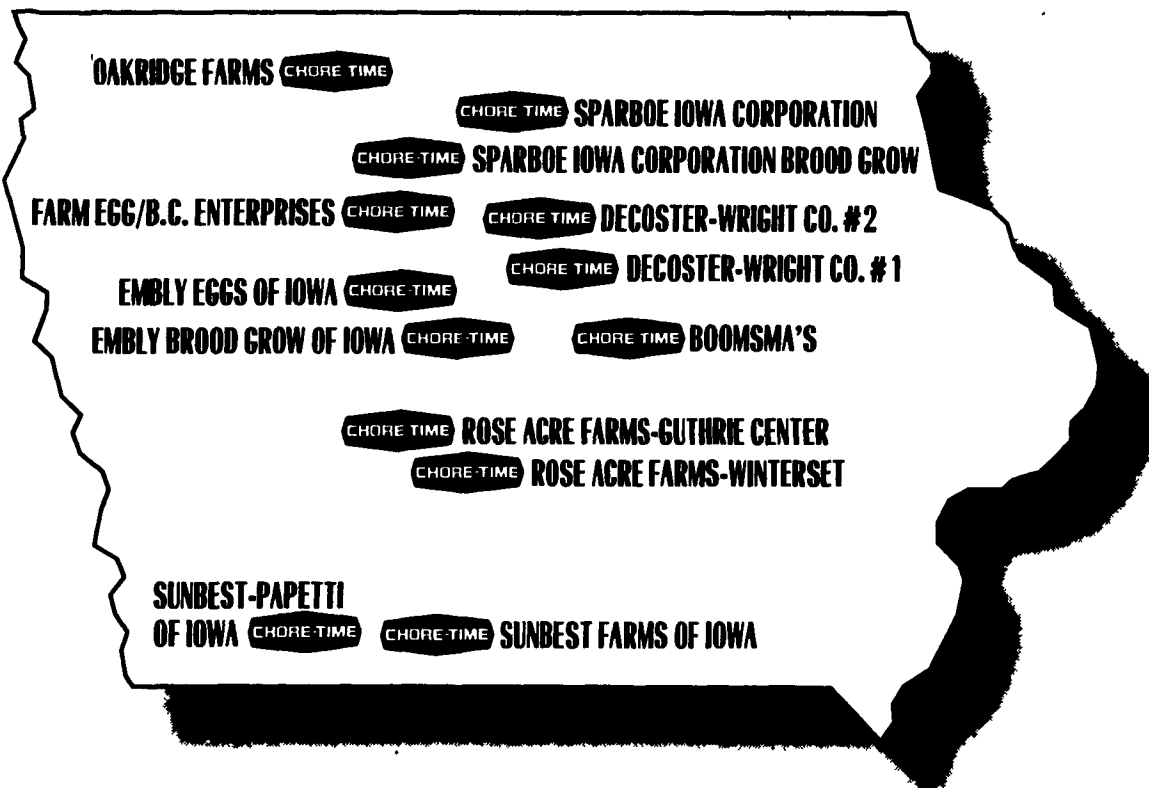
- Must be willing to follow a nutrient management plan prepared by a district-approved agronomic consultant for the 10-year period.

Signing up for the financial assistance program does not guarantee approval in the program. Only those landowners with serious nutrient and/or soil erosion problems will be evaluated by a technical assessment and needs determination of the farm completed by the staff of the Chester County Conservation District and the Natural Resource Conservation Service. Final eligibility determination will be made by the Chester County Conservation District board of directors. Eligibility may also be postponed because of limited funds.

For further information, contact Steve Thompson, Chesapeake Bay resource conservationist, or Dan Grieg, district manager, at (610) 696-5126 or 436-9182, or visit the office.

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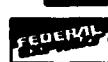
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