

Penn State

Poultry Pointers



Agricultural & Biological Engineering

Agricultural Economics

EXERCISE IMPROVES BONE STRENGTH

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calcium to the skeleton occurs, the replacement process is not perfect — an incremental loss of bone takes place that eventually results in weakened bones. The resulting condition is known as "cage layer fatigue."

Even though good management practice will have provided the hens with a high density source of calcium, such as oyster shell and various limestone sources, by the end of its efficient laying period, the hen will have a substantially weakened skeleton. This creates a problem at the processing plant. A 1989 study in Britain found that nearly a third of spent layers had broken bones by the time they reached the scalding tanks and most had incurred fractures at the end of the evisceration line.

Maintaining strong bones is a complex challenge. Numerous factors are involved. A place to

begin would be to select genetic strains that have thick bones. The premise is simple: thicker bones have more calcium to lose.

Nutrition is an important factor to consider. This is a complicated issue and many factors are involved, but especially important are intake levels of calcium, phosphate, and vitamin D. The hormone status of the hen is an important consideration, but difficult to manipulate.

Also high on the list of important relevant factors is exercise. Bone responds remarkably to exercise. Both bone mass and bone strength increase as a result of regular exercise. We have some understanding of why this is so. Passing within bone is a system of tiny pipes, called canaliculi. When an individual moves, intermittent compressive forces are applied to the bones. Fluid in the canaliculi surges down the direction of the force and into all fluid spaces in the bone. Cells within bone are in contact with this fluid.

Cells within bone respond to intermittent compressive force by forming more bone. Specifically, bone cells synthesize and secrete proteins that calcify. The cells detect the application of mechanical forces through unique molecules on the cell surfaces that respond to being stretched, or perturbed when the fluid in bone flows over the cell. When stimu-

lated, the force-detecting surface molecules react by changing shape. The molecule in its new shape can interact with a second, different molecule. The two molecules now fit together, much like two pieces of a jigsaw puzzle and, together, trigger a series of chemical reactions that results in stimulating the bone cell to synthesize and secrete protein.

It is well established that exercise stimulates bone formation in

humans. For birds, fewer studies have been made, but it is known that broilers and laying hens raised in floor pens have stronger bones than those reared in cages. Exactly how much exercise is required for strengthening bones in hens is not known. Based on the available data for mammals, a means of exercising caged hens is likely to be of considerable value provided that a practical system could be devised.

Financial Workshop Set

SCHUYLKILL HAVEN (Schuylkill Co.) — All interested in farm financial management are invited to attend a series of three evening meetings on "Farm Financial Management."

Husbands and wives and/or business partners are encouraged to attend as management teams. The meetings will be held on January 6, 13 and 27, from 7 p.m. to 9 p.m. The meetings will be held at the Penn State Schuylkill Campus Conference Center, Schuylkill Haven. The sessions are presented by Schuylkill County Cooperative Extension.

J. Allan Shoener, extension agent, agriculture, will be speaking on the following topics: farm business plans, financial management tools (balance sheets, cash-flow statements, partial budgets, financial statements), and enter-

prise budgets.

The program is designed to be a practical hands-on workshop to aid in managing your farming operation. The discussions will cover the steps needed to plan a farm operation, understanding and using financial management tools, and developing and using enterprise budgets. The program will build on previous farm financial management clinics and will involve class and homework assignments. Ample time will be allowed for discussions, questions, and answers.

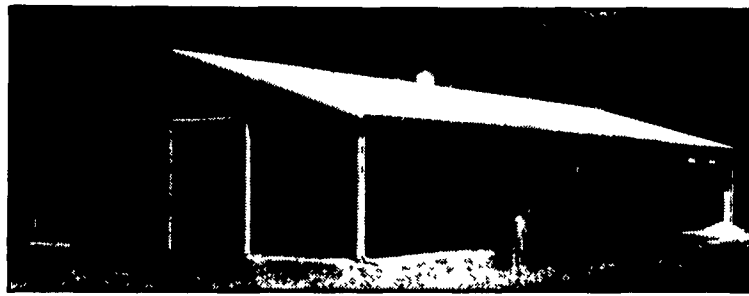
Advance registration is required (no fee). Registration is due by January 3. To register or for more information on the workshop, contact the Schuylkill County Cooperative Extension office, P.O. Box 250, Schuylkill Haven, PA 17972-0250, (717) 385-3431.

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