Hens Help Scientists Study Bones in Humans

Hens are helping scientists at Pennsylvania State University study the process of bone formation and bone destruction. The experiments may help to diagnose and treat bone diease, a serious problem in older people.

Such bone formation and destruction proceeds continuously, even in adults. The rapid turnover of calcium in laying hens offers a unique system for studies of this mineral metabolism, says Dr. Werner J. Mueller, Penn State professor of poultry science.

Each egg shell contains about two grams of calcium, he explains. In producing 250 eggs a year, about average, a hen puts into shells an amount of calcium equaling 20 times the calcium content of her body.

Bone metabolism is very rapid in hens, Dr. Mueller and associates have determined. Using radioactive calcium, they found that a hen's skeleton provides 30 to 40 per cent of the egg shell calcium—mostly late at night when little feed calcium is left in the digestive tract.

Medullary bone is the main reservoir of calcium in hens late at night. This medullary bone is first deposited in the central marrow cavities of the long bones of pullets about 10 days before they start to lay eggs. This unique bone is found only in hens—it does not occur in rooster, immature poultry, or mammals.

This medullary bone shows amazingly rapid shifts from destruction or resorption, as shell is formed, to bone formation when no shell is being formed.

Loss of calcium in older persons is attributed generally to a lack of balance between bone formation and destruction. Most people, especially women, lose bone mineral gradually after age 50. This usually goes unnoticed.

However, in one out of four women over 65, increased porosity of bone leads to frequent fractures, collapse of vertebrae with back pain, and deformation of the spine known as dowager's hump. Treatment of these disorders is hampered by the fact that little is known about the mechanism of bone resorption in man.

Bone destruction in hens is associated with increased acid production and slowed circulation of blood. Dr. Mueller believes both of these changes may increase the acidity of the fluids which bathe bone mineral, leading to its being dissolved. The two factors were determined by sampling blood before it entered and after if left the bone

From various experiments, he concludes that acid production is also a limiting factor in egg shell formation. The Penn State studies have observed that considerable amounts of acid are released into the blood by the shell gland during shell formation.

Dr. Mueller and associates were the first to find that hens which lay thin shelled eggs have a more acidic shell gland fluid than hens laying thick shelled eggs. Feeding acidic substances, moreover, has been found to reduce shell thickness.

Arizona Feedlot- Fewer and Bigger

It's not hard to tell in a few words the main story of Arizona's important cattle feeding industry—feedlots are getting fewer and larger, according to the USDA.

As Americans have stepped up their beef consumption, the industry has boomed, and Arizona has become one of the top 10 States in cattle feeding. From 1950 to 1970, Arizona had a sevenfold increase in the number of cattle on feed.

Unlike the Cron Belt, where cattle are traditionally fed on farms, Arizona has concentrated its feeding in large feedlots.

Last year, 14 feedlots—each with a capacity of more than 16,000 head—marketed 70 per cent of that State's fed cattle. In all, there were 61 feedlots in 1970, and they marketed 860,000 cattle. As recently as 1962 there were 189 feedlots, though they marketed far fewer cattle—568,000

The trend toward larger feedlots is Arizona is expected to continue, principally because of the economies of size. Such costs as labor and land and buildings go down markedly on a per unit basis as the number of cattle fed increases.

An Arizona study indicates variable costs (excluding feed) decline from $24.07 per head in feedlots of up to 5,000 capacity, to $16.10 a head in those with a capacity of 20,000. Likewise, fixed costs decline from $11.53 per head to $6.52 in the larger feedlots.

Total annual fixed and variable costs of owning and operating the feedlot, exclusive of feed, amounted to $35.60 per head for a 5,000-head unit contrasted with $22.62 for the 20,000-head unit.

This is one reason the number of feedlots with a capacity of fewer than 1,000 head dwindled from 95 in 1962 to 9 by 1968. Those with a capacity of fewer than 4,000 head also decreased in number, as well as in the volume of cattle handled. Only those feedlots with a capacity of more than 16,000 head marketed more cattle in 1968 than in 1962.

One of the most common forms of cattle feeding in the State is custom feeding. The customer furnishes cattle for the feedlot and pays a charge for each ton of feed consumed plus veterinary fees. The feedlot is responsible for feeding the cattle and, generally, for providing marketing service as well.