

Poultry Science Capital Region Veterinary Science

Penn State

Poultry Pointers

Entomology Food Science

Agricultural & Biological Engineering Agricultural Economics



HOW CALCIUM IS TRANSPORTED TO THE EGGSHELL

Dr. Carol V. Gay
Professor Of
Molecular And
Cell Biology
And Poultry Science

Egg-laying hens have a remarkable capacity to handle calcium. It is well documented that calcium in feed is readily absorbed by the intestine by a process that requires Vitamin D.

After passing through the intestinal lining, calcium moves into the bloodstream, where it binds to a protein called vitellogenin, a unique substance capable of carrying large amounts of calcium to various parts of the body. When

vitellogenin-bound calcium arrives in the shell gland, seconds after being absorbed by the intestine, it is released and taken up by the shell gland tissue if an egg is present. (If an egg is not present, calcium is stored in bone.) The structure of the shell gland is ideally suited to forming eggshells which are made mainly of calcium carbonate.

There are basically two types of cells in the shell gland. One type forms a sheet that stretches over the calcifying eggshell and thereby lines the shell gland. The other type forms little tubes, called tubules, that lie beneath the sheet of lining cells where they intermingle with numerous blood vessels. The tubules open into the space occupied by the egg. All these structures are readily seen in a microscope; however, the pre-

sence of so many blood vessels is obvious upon dissection. A fresh shell gland is a robust shade of dark red.

For calcium to reach the eggshell, it must pass out of the blood vessels into the space around the vessels and across either the sheet of lining cells or into the tubules. Twenty years ago, researchers, using the available techniques to trap calcium, suggested that the lining cells were responsible for the transfer of calcium. It was a reasonable suggestion that has turned out to be incorrect. Now, with the advent of new microscopic methods, it is clear that calcium moves across the tubule cells and is pumped into the tubules where it can flow into the space occupied by the egg.

The new methods, developed over the last few years, include a stain for marking another calcium carrying protein that moves calcium through the cells of the tubule walls. This special protein is called calbindin and is made by tubule cells only in the presence of estrogen.

A second method was developed that allows an investigator to look in a microscope and locate the position of calcium pumps. In this manner, a "calcium pump" was found on the side of the cell that faced the inside of the tubule. These studies have made it clear what route the calcium takes.

Calcium diffuses into a tubule

cell from the side closest to blood vessels. It moves through the cell bound to calbindin and finally it is pumped out of the cell by an energy-requiring pump (another unique protein) into the tubule.

It is anticipated that the best laying hens will have high levels of

the unique proteins that are involved in moving calcium along its complicated pathway. However, little is understood about the biochemistry and genetics that directs this highly orchestrated physiological process.

N.Y. Young Sire Evaluation Sale Held

EATON, N.Y. — Bull prices were strong and demand was good at the New York Young Sire Evaluation Sale held at the Cornell T & R Center in New Hartford on April 23. The 16 bulls in the sale sold at an overall average price of \$1328.

The top-selling bull was a Polled Hereford from Sapp Valley View Farm in Buckhannon, W. Va. and sold for \$2,700 to Temperance Hill Farm, Cazenovia, N.Y. The top-selling Angus bull, bred and owned by Phil Taylor of Dancote Farm, Lawtons, N.Y., sold for \$1,950.

Breed averages for the five breeds represented in the sale were Polled Hereford, \$1,894; Angus, \$1,630; Limousin, \$1,500; RX-s, \$916; and Simmental, \$1,250.

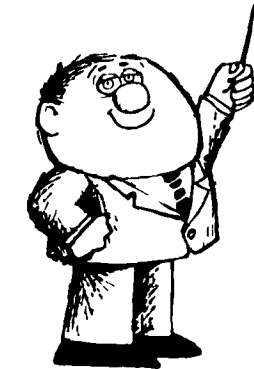
The Young Sire Evaluation Program is an on-farm based program that evaluates bulls based on their expected progeny differ-

ences (EPDs). EPDs are an extremely important tool used by breeders for sire selection.

Final evaluation before the sale included breeding and structural soundness, rib eye area and backfat thickness measurements, yearling weight and weight per day age, frame score and health status and certification. With this detailed information available, producers can choose a herd sire which will best suit their herd and breeding program.

The Young Sire Evaluation Program is cosponsored by Cornell Cooperative Extension and the New York Beef Cattlemen's Association.

For more information on this program or other activities related to beef cattle production, contact the NYBCA Executive Secretary Carol Gillis at (315) 684-7114 or write to P.O. Box 246, Eaton, NY 13334.



A LESSON WELL LEARNED... LANCASTER FARMING'S CLASSIFIED ADS GET RESULTS!

JUNE IS DAIRY MONTH

Natchez Animal Supply
Low Prices
Eqvalan Horse Wormer (Ivermectin paste 1.87%) \$9.19 per Tube
• VACCINE • ANTHelmINTICS
• WORMERS • VITAMINS
• INSECTICIDES

PRODUCTS FOR CATTLE...DOG...CAT...HORSE...SWINE

★ Request ★
New Catalog

P.O. Box 1528V • Natchez, MS 39121
1-800-447-8760
2nd Day and next day air available

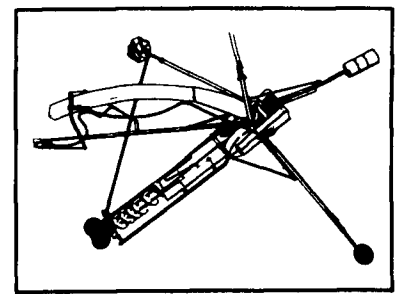
0% - 12 Mos.
4.9% - 24 Mos. OR
7.9% - 36 Mos.

5 Months
Waiver Of
Finance!

...Now Available On Most Badger Equipment!



EMPLOYEE-OWNED. QUALITY DRIVEN.



Pack Drive Silo Unloader Badger Frost Busters!

- Center-mounted blower allows for further travel between doors
- Simple, trouble-free collector ring designed for greater ease of service
- Quick installation and low cost, the ideal replacement unit
- High strength, extra-heavy angle iron frame
- Rugged 10" auger with double flighting on outer end, equipped with heat treated Zinc Dichromated knives
- Heavy-duty chipper sheel shaves silo wall clean



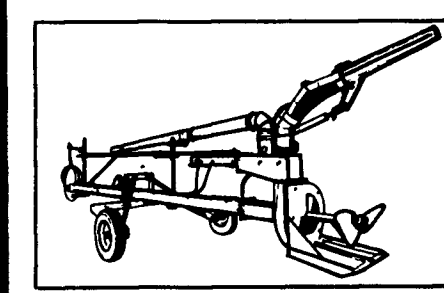
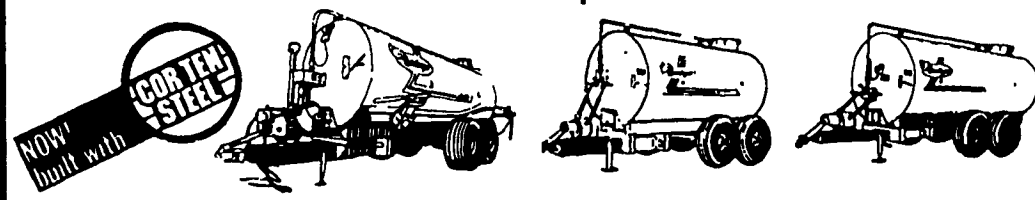
Ring Drive Silo Unloader



See Your Local Badger Dealer

- HONESDALE SPREADING SERVICE INC.**
505 Cliff St.
Honesdale, PA 18431
(717) 253-2410
- CHIDESTER FARMS**
RD 2, Box 75
Kingsley, PA 18826
(717) 289-4260
- MELVIN G. MILLER**
RT 2, Spring Mills, PA 16875
(814) 422-8279
- PIKEVILLE EQUIPMENT INC.**
RT 2, Oley, PA 19547
(215) 987-6277
- BHM FARM EQUIP. INC.**
RR 1, Annville, PA 17003
(717) 867-2211
- SHOW EASE STALL CO.**
573 Willow Rd
Lancaster, PA 17601
(717) 299-2536
- DEERFIELD AG & TURF CENTER, INC.**
RD 2, Box 212
Watsonstown, PA 17777
(717) 538-3557
- HEFLIN SALES & SERVICE**
12312 Oak Hill Rd.
Woodsboro, MD 21798
(301) 898-3233
- CHAMBERSBURG FARM SERVICE**
975 S. Main St.
Chambersburg, PA 17201
(717) 264-3533
- SOMERSET BARN EQ.**
R.D. #5
Somerset, PA 15501
(814) 445-5555
- McMILLEN BROS.**
RD 1 Box 134
Loyalsville, PA 17047
(717) 789-3961
- HESS' EQUIPMENT**
Sales & Service
RR 3, Milliflburg, PA 17844
(717) 906-2720
986-1998

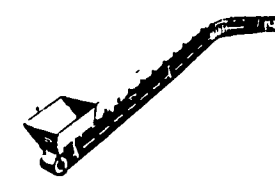
Badger Liquid Manure Pumps, Spreader Tanks and Box Spreaders



Badger BN185 Souper Trail Pump/Agitator

- Up to 26,000 GPM agitation capacity
- Standard 28 foot length extendable to 38 feet for really big lagoons
- Choice of cutter blade or propeller options to match biggest agitation needs
- Exclusive internal shear bar chops even straw-laden manure
- Semi-cupped impeller paddles for high capacity pumping

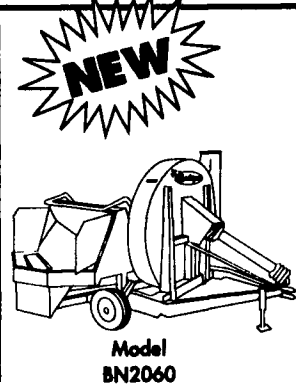
Badger Belt or Single Chain Conveyors...



0% - 12 Mos.
4.9% - 24 Mos.
7.9% - 36 Mos.
OR
5 Months
Waiver Of
Finance!

NEW... From Badger

Ask Your Dealer About The All New BN 104 PUMP



Badger Forage Boxes & Running Gear... The Right Combination For Your Farm!

Badger Blowers Beat Bottlenecks

- Designed for plug-proof operation
- Unload wagons faster, fill silos more efficiently
- Choose from Model BN2054 or New Model BN2060, for bigger silos
- Rugged, heavy-duty construction
- Adjustable shear bar prevents hair pinning, carry-over and power loss.
- All material goes up the pipe in the air stream
- Flexible wind guards minimize spillage.