Seminar Evaluates Importance Of Poultry Immunity

(Continued from Page A1)

Mashaly noted a special blood test which measures the H/L ratio (the ratio of heterophils and lymphocytes) as a barometer of chronic stress.

The H/L ratio is a "reliable way to measure stress in birds," he told more than two dozen poultry house managers and agri-industry representatives at the seminar.

Measuring the H/L ratio is a "very easy test you can do to determine if the individual is under stress," said Mashaly. The ratio is used widely for immunologists to examine stress.

The ratio is higher with broilers or layers under stress. It can indicate heat, humidity, ammonia exposure, hormones, and nonspecific causes of overall stress.

A normal H/L reading is .3. When the H/L ratio reaches 1, "you have a problem," said Mashaly.

The word "immune" comes from the Latin word meaning "safe." The immune system, similar across species, even humans, makes us "become safe," Mashaly said. "It protects us."

The system reacts when foreign substances, called antigens, invade the body. The system reacts against "non-self" substances in the body, not against itself. If there are reactions against the self, those are called "autoimmune" responses.

The substance, or antigen, responsible for the immune response can be soluble material such as proteins on the surface of an invading cell.

Two different kinds of acquired immunity are active and passive. With active immunity, the body has to "do something," said Mashaly. With passive immunity, the body does not have to do anything to protect itself. An example of passive immunity is something received innately, such as maternal immunity from mother's milk for mammals or yolk for poultry.

Active immunity occurs when an individual is exposed to foreign material. Being exposed to the substances can be natural, with antigens in the environment around us, and artificially through vaccination.

With vaccination, either live or killed virus can be used. Both can have the same effect.

Passive immunity is only short-term immunity.

Sources of immunity include primary or central lymphoid organs, or glands, which secrete hormones. In chickens, there are two major central organs, including the bursa of Fabricius (present only in avian species) and the thymus (present in poultry and mammalian species).

The bursa produces B-lymphocytes. The bursa develops at four days of incubation but disappears after a time. The thymus is responsible for cell-mediated immunity, producing T-(for thymus)lymphocytes.

The T-cells can migrate to secondary organs, including the spleen, lymph nodes, cecal tonsil, Hardian gland, bone marrow, the peyeris patches (along the intestine), and the pineal gland. Removal of those organs does not severely impair the immune response, according to Mashaly.

A complicated process allows the body to produce organisms that can "present" the antigens for processing. Other types of cells are generated in the process to rid the body of dangerous antigens.

When vaccinating, the body is exposed to antigens that cause this immune response, which can last for a few hours to a few days. The first time a vaccination takes place, there is a response. But it's the important response later, the secondary or anamnestic (Greek for "recollection') response, which creates a rapid rise in antibodies, which provides stronger and longer reaction.

The T-cells generated serve a variety of functions. There are T-helper, T-suppressor, T-cytotoxic, and Natural Killer, or NK cells. NK cells are involved in the destruction of tumors in the body.

Cell-mediated reactions protect against bacterial, virus, and virus- infected cells, and protect against foreign tissue grafting and tumor cells. Allergic responses are an immune response, of sorts.

Mashaly believes that perhaps the female has a better immune response, that the environment plays a key role in determining that response, and that hormones generated because of stress (ACTH or corticosterone) can change the H/L ratio. Diet and nutrition are critical factors to boost immunity, including energy and protein, proper vitamins (A, C, E, and B) with minerals, and genetic factors are especially critical to birds "when they are under stress," he said.

Dr. Magdi M. Mashaly, associate professor of poultry science at Penn State, left, not only provided an overview of the workings of the immune system in birds, but pointed out the importance of measuring stress — a barometer for the prevalence of disease and a tool to use to boost the immune system. At right is John Schwartz, Lancaster County extension director.

"Vitamins are very important as antioxidants," he said.

Mashaly pointed to the following strategies to use immunity to control disease:

- Reduce the level of exposure through biosecurity.
- Reduce overall bird stress (give proper feed, water, and housing).
- Chemotherapy, or using chemicals to boost or improve immunity, can work but are costly.
- Vaccination. It's the best as far as giving protection, he noted. But it only protects against a specific disease. The result will be to get rid of the foreign substance, or antigen, causing the disease.

But Mashaly cautioned that the use of too many vaccines too often has raised issues regarding resistance. Also, the vaccines also play a part — yet completely undetermined — in how human immunity is affected, after humans eat poultry. Overmedicating can be no replacement for good, overall health management of birds.

Also Mashaly believes that poultry DNA mapping will provide insights into the use of bird genetics to protect birds from disease. Some of that research can be carried over, eventually, to helping humans control disease.