inflammatory processes, metabolic factors, complement, and interferon.

The reason that good management practices are important in maintaining poultry health is better understood when the non-specific immune mechanisms are defined. For example, poor sanitation or the overuse of antibiotics may lead to a disruption of the normal microflora; poor nutrition may lead to deficiencies that allow disease organisms to penetrate the protective body coverings; selection of disease resistant strains of chickens may preclude or lessen the effects of certain diseases.

In contrast, specific immune mechanisms (acquired system) are characterized by specificity, heterogeneity, and memory. This system is divided into non-cellular (humoral) and cellular components.

The non-celluar components include immunoglobulins (antibodies) and the cells that produce them. Antibodies are specific (specificity) for the foreign material (antigen) to which they attach. For example, the antibody against Newcastle disease virus will attach only to the Newcastle virus, not to the infectious bronchitis virus (heterogeneity). There are three classes of antibodies that are produced in the chicken after exposure to a disease organism: Ig M, Ig G, and Ig A.

Ig M appears 4 to 5 days following exposure to a disease organism and will disappear in 10 to 12 days. Ig G is detectable 5 days following exposure, peaks at 3 to 3 1/2 weeks, and then slowly decreases. Ig G is the important protective antibody in the chicken, and is measured by most serologic test systems. Thus, if you are interested in determining antibody titer levels following vaccination, you should collect sera after 3 to 3 1/2 weeks. If sera is evaluated prior to this time, the antibody titer levels are still increasing, which makes interpretation of the vaccination program difficult. Ig A appears 5 days following exposure, peaks at 3 to 3 1/2 weeks, and then slowly decreases. This antibody is found primarily in the mucus secretions of the eyes, gut, and respiratory tract, and provides "local" protection to these tissues.

The cells that produce antibodies are called B-lymphocytes. These cells are produced in the embryonic liver, yolk sac, and bone marrow. The cells move to the bursa of Fabricius (BF) at 15 days incubation and remain there through 10 weeks of age. The BF programs these cells, which then move to the blood, spleen, cecal tonsils, bone marrow, Harderian gland, and thymus. Destruction of the BF at a young age by Gumboro disease virus or Marek's disease virus prevents the programming of B-cells. Thus, the chicken will not be able to respond as effectively to diseases or vaccinations by producing antibodies.

When a disease organism enters the body, it is engulfed by a phagocytic-type cell, the macrophage. The macrophage transports the disease organism and exposes it to the B-lymphocytes. The B-cells respond by producing antibodies 5 days following exposure. The lag period occurs because the B-cells must be programmed and undergo clonal expansion to increase their numbers. If the chicken is exposed a second time to the same disease, the response is quicker, and a much higher level of antibody production occurs (memory). This is the basis for vaccinating.

Antibodies do not have the capability to kill viruses or bacteria directly. Antibodies perform their function by attaching to disease organisms and blocking their receptors. The disease organisms are then prevented from attaching to their target cell receptors in the chicken. For example, an infectious bronchitis virus that has its receptors covered with antibodies will not be able to attach to and penetrate its target cells, the cells lining the trachea. The attached antibodies also immobilize the disease organism that facilitates their destruction by macrophages.

The cellular component includes all the cells that react with specificity to antigens, except those associated with antibody production. The cells associated with this system, the T-lymphocytes, begin as the same stem cells as the B-cells. However, the T-lymphocytes are programmed in the thymus rather than the BF.

The T-lymphocytes include a more heterogeneous population than the B-cells. Some T-cells act by producing lymphokines (over 90 different ones have been identified); others directly destroy disease organisms. Some T-cells act to enhance the response of B-cells, macrophages, or other T-cells (helpers); others inhibit the activity of these cells (suppressors). The cellular system was identified when it was shown that chickens with damaged BF could still respond to and eliminate many disease organisms.

A chicken may become immune to a disease organism by producing antibodies itself or by obtaining antibodies from another animal. When the