ALL-IN ALL-OUT PRODUCTION SYSTEM IN THE PREVENTION AND CONTROL OF POULTRY DISEASE

D.A. McMartin, Vet Med Extension, UC Davis

It is often extremely difficult to quantify the effects of either individual diseases or the cumulative effects of disease on single sites, in a region or in an industry. Major variables include the breed or strain of bird, the growing conditions, location, management, diet and weather. On a single site, house-to-house performance can vary. For valid comparisons, houses or locations have to be compared for at least three cycles before the data begins to be accurate. So precise field data are hard to come by. However, there is much experimental data to show that the cleaner you can make the bird environment, the better the birds grow. Coates and others (1963) showed that chicks in a germ-free environment grew 15% faster than chicks in a conventional one. Several workers have shown that chicks raised in clean, sanitized conditions grew better than those kept in "recycled" conditions, even when there was no detectable disease or any recognized pathogens isolated (Libby and Schaible, 1955; Hill and others, 1952; Lillie and others, 1952).

But even if we do not have good comparative field data, we only have to look at what we know about diseases, production systems and disease control methods to realize that the risks of disease on multi-age sites are much greater than on all-in all-out systems. The four factors I want to look at briefly here are eradication, vaccination, biosecurity and internal ranch hygiene.

Eradication

In the U.S., on an industry-wide basis, only two enzootic (already existing) organisms are close to eradication. These are Salmonella pullorum and S. gallinarum. Schemes have been in progress for about 50 years, and we still have not quite succeeded. The message is that microorganisms are very difficult to control. We also use eradication for epizootic organisms such as virulent avian influenza and VVND--but look what it costs.

Vaccination

Vaccines can be very effective in preventing or even helping to eliminate disease in some situations. However, we have come a long way from thinking the vaccine has just to be dropped in the drinking water or sprayed around the poultry house. We have to think of parental antibody, realize it is often variable, balance that with virulence of vaccines and timing of vaccination and re-vaccination. Inactivated vaccines can be very effective in some situations, but don't provide local tissue immunity. We also know now that many live vaccines can persist, and that this gives them the opportunity to spread to other birds at the wrong times, or to change themselves into different strains. A classic example of a persistent live vaccine is for MG (MGF). Infectious bronchitis (IB) virus can also persist, and there are now numerous strains and substrains. Newcastle disease (ND) is not so certain, but I have isolated mild

(BI) type from unvaccinated broilers 47 days after it was last used in a cluster of "separate" broiler units. Fortunately, there is only one immunological type of ND, so far.

Biosecurity

The value of biosecurity in preventing ravaging diseases such as VVND and influenza is well known. This tells us that biosecurity is also effective against other, less easily recognized diseases. One of the worst outbreaks of IB I ever saw in a breeding flock occurred in a situation where the birds had not been vaccinated, and used egg flats were brought to the ranch from a site about 200 miles away where IB was present.

On-site Hygiene

Observation and field experience tells us that sites with continuous production, or clusters of sites close together, tend to have more disease problems than those which have a production break or have some degree of isolation. Resistant specific disease organisms such as infectious bursal disease (IBD) have more chance to survive in a continuous situation. So would salmonellae. Even with "non-specific" organisms (Escherichia coli, Streptococci, Staphylococci, yeasts) birds can only withstand so much pressure. I have seen respiratory disease and E. coli septicemia appear in broilers by increasing the stocking density from 200 to 250 per 100 square feet, even though no specific disease such as MG, IB or ND were present.

Recent work is starting to tell us what happens to birds which live in "dirty" environments. Some of this work is being done by Dr. Kirk Klasing, Avian Sciences, UC Davis (Klasing, 1990). Birds which have to defend themselves against invading microorganisms do so by producing an immune response. When this happens, several metabolic changes take place. These include decreased skeletal muscle protein synthesis, impaired lipid utilization, increased metabolic rate and decreased feed intake. These changes operate until the immune response is over. If immune responses are being triggered continuously, the bird's performance will continuously suffer. When Dr. Klasing was asked how he would improve the nutrition to compensate for such situations, he replied "I would improve sanitation."

Final Thought

A multi-age site can be economically efficient if it is well-managed. It will probably have more disease and mortality than a single age, well-managed site. There are certain diseases which are very difficult to control on multi-age sites. On the other hand, there may be a "too clean" situation for chicks, which might help establishment of salmonellae in the gut.

REFERENCES

Coates, M.E. and others, 1963. British Journal of Nutrition, 17:141.

Hill, D.C. and others, 1952. Poultry Science, 32:464.

Klasing, K.C., 1990. In "Biotechnology in the feed industry", edited by T.P. Lyons, Alltech Technical Publications, Nicholasville, KY 40356.

Libby, D.A. and P.J. Schaible, 1955. Science 121:733.

Lillie and others, 1952. Poultry Science, 32:466.