Alternative health strategies for organic and free-range poultry

A different perspective

Prepared and Presented by Michael Sommerlad of “Poultry Works” at the Feedworks Coolum 2010 Nutrition Workshop

Introduction

About the presenter –

About the presentation:

Look at a range of issues affecting non-conventional poultry production systems

Will conclude with a five minute question time, so please feel free to prepare questions as they come to mind throughout the presentation

Why organic and free-range?

Production sectors driven by consumers and their requirements, beliefs and perceptions, including:

- Improved animal welfare outcomes
- Better eating quality of products
- Environmentally friendly
- Sustainability
- A healthy alternative to conventional products

Why organic and free-range?
(continued)

The latest "driver" – supermarkets

Increasing pressure is being brought to bear by the major supermarket chains for animal products to come from "ethical sources", e.g. the ban on sow stalls

It is likely that these supermarket chains will require greater levels of transparency and accountability from livestock producers and certifying bodies alike.

Why the need for alternate health strategies?

Requirements of certification –

e.g. the prohibition of antibiotics in organic production systems

Peculiarities of extensive production environments –

e.g. inability to effectively control the faecal/oral cycle or the ingestion of plant matter

Appeasing consumer perceptions –

e.g. beak trimming

Why the need for alternate health strategies?
A closer look

Nutritional "dilemmas" – genetic modification

•Completely forbidden under current organic standards

•Other non-conventional or supermarket imposed standards could follow suit

•In the immediate term, this means that there are no protease enzymes (at least according to my investigations) commercially available that do not contain some GM components

•In the longer term, there may also be an implication for the use of corn, soy and canola products in poultry feed

Nutritional “dilemmas” – methionine

The use of methionine in organic monogastric rations has been a controversial subject over the last 9 months, with Standards Australia moving to place an immediate ban on the use of synthetic methionine in organic rations.

This move has been temporarily postponed, and it is likely that there will be a gradual phase-out of its use over the next 3 to 5 years (as is the case in the US), but organic producers must start preparing for synthetic methionine free organic rations in the near future.

Health and Disease Dilemmas

The use of prophylactic antibiotics has been reduced or banned in most countries, however antibiotics are still widely used to control a range of pathogenic micro-organisms.

Therapeutic use of antibiotics is still permitted in most conventional production environments, but is completely forbidden in all organic standards.

Health and Disease Dilemmas - pathogenic microbe control

Where the use of therapeutic antibiotics is forbidden, producers can face some serious health issues, particularly from virulent micro-organisms, or those proliferating under ideal growing conditions. Two such organisms that I have seen wreak havoc in organic flocks are:

- Fowl Cholera *(Pasteurella multocida)*
- Necrotic enteritis *(Clostridia perfringens)*

What are the alternatives?

The range of “acceptable” non-conventional treatments, feed additives and medications grows almost daily, and includes:

- Probiotics
- Prebiotics
- Phytogenics
- Organic acids

What are the alternatives?
(continued)

However, these are not the only “tools” available to the non-conventional poultry producer, as there are also a number of husbandry practices that can be employed to assist with the prevention and/or treatment of diseases and maladies including:

- Pasture rotation
- Manipulation of gut development and physiology through feeding practices
- Controlled exposure to infective organisms
- Utilising different genetic strains

Constraints to production

Non-conventional poultry producers need to deal with a range of unique circumstances not shared by their conventional counterparts. These include:

- The inability to control temperature
- The inability to control net nutrient intake in the presence of high quality pastures
- The inability to control the ingestion of toxic or harmful plant materials
- The inability to control photoperiod in growing birds
- Exposure to predators and other wild birds and animals
- The need for vehicular transport between disparate production sites
- Multi-age production systems

Constraints to production – a closer look

Inability to control temperature – the issues:

- Increased energy demand during cold weather
- Poor feed intake during hot weather
- Difficulties in meeting net calcium requirements during hot weather
- Increased stress levels during periods of fluctuating weather conditions e.g. strong winds, rain events, extreme cold

Constraints to production – a closer look (continued)

The inability to control net nutrient intake in the presence of high quality pastures – the issues:

- Poor weight gains prior to the onset of production
- Reduction in egg size and quality
- Increased incidence of “feather-pulling” resulting in poor feather cover and increased exposure to extremes of temperature
- The need to constantly re-formulate rations as pasture quality changes throughout the year

Constraints to production –

a closer look (continued)

Free-choice feeding –
a solution to many of these problems

In an attempt to overcome some of these difficulties, I have implemented a free-choice feeding system for use with pasture fed layers. I have trialled the same concept with pasture fed broilers with excellent results, but currently have no commercial broiler operations using the system.

The free-choice feeding systems that I utilise are quite simple, and provide the birds with three distinct ingredients :

•Whole grain – providing the carbohydrates

•A “protein concentrate” – providing the majority of the protein and all the vitamin and minerals and other “micros”

•A calcium source – normally a coarse limestone grit

Free-choice feeding

How does it work? Some practical examples:

•*Increased energy demand during cold weather*

Birds have the freedom to consume more carbohydrates during times of peak metabolic demand, and then balance their nutrient intake at some other time during the day

•*Poor feed intake during hot weather*

As above, only this time the emphasis will be on the consumption of protein during the heat of the day, with the carbohydrate consumed either early in the morning or late in the afternoon

•*Difficulties in meeting net calcium requirements during hot weather*

Of all the benefits of free-choice feeding of layers, this is probably the easiest to demonstrate and repeat. In a complete ration, where the calcium is contained in the mash/pellet, the bird must go to the feed pan/trough to ingest calcium. However, the peak demand for calcium often occurs in the mid afternoon, when tomorrow's egg is in the shell gland. This is also normally the hottest time of the day, and birds are reluctant to ingest carbohydrate during these hot periods. By taking the calcium out of the feed, and making it available as a separate entity, the birds are able to satisfy their natural demand for calcium regardless of ambient conditions

Poultry diseases – potential problems

Apart from the various environmental and operational constraints faced by non-conventional producers, there are also a number of disease issues that either pose a current threat, or have the potential to become serious problems as the industry grows. These include:

- Fowl Cholera
- Spotty Liver Disease
- Cestodes (tapeworms)
- Red mite

In the interests of time, we will have a look at the first two.

Fowl Cholera

Image courtesy of Cornell University College of Veterinary Medicine, Partners in Animal Health, and the United States Department of Agriculture

- *Pasteurella multocida* is becoming increasingly prevalent amongst extensive poultry production environments, particularly free-range and organic layers.

- Potentially a highly pathogenic bacterial infection capable of inflicting extremely high mortalities across flock (I have personally seen losses exceeding 50%)

Fowl Cholera
(continued)

Although this disease can strike any type of poultry production system, Fowl Cholera represents a particular problem to extensive production systems because:

a)The disease can be transmitted by a range of fomites, including rodents, wild birds, domestic pets, predators, vehicles and clothing.

b)Cannibalism within a flock accelerates the rate of spread which in turn can affect mortality levels.

c)There is an increase in the prevalence and persistency of the disease on multi-age sites.

Fowl Cholera - control

•If an outbreak of the disease does occur on a site, the Pasteurella organism is susceptible to a number of antibiotics.

•However, such an occurrence can be avoided if the birds are vaccinated prior to exposure to the disease

•Vaccination for Fowl Cholera has traditionally been conducted with proprietary killed vaccines, however these killed vaccines are limited in their effectiveness by the need for an exact match between the serovar or strain of the organism contained in the vaccine and that infecting the birds.

•A new live, attenuated vaccine has been developed and will soon be released, which negates the need for an exact serovar match. However this vaccine will probably not be available to organic producers because it utilises gene deletion technology, and may therefore be described as genetically modified

Fowl Cholera – other options?

It might appear that the odds are stacked against the organic producer, but there are still a few viable options open to these producers, including:

- Implementation of effective biosecurity
- Strategic use of antimicrobial phytogenics
- Development of an autogenous vaccine

Fowl Cholera – Biosecurity

Biosecurity – always the best place to start!

•Predators – are birds, dogs, foxes, cats, quolls or even phascogales gaining access to the site and killing birds?

•Rodents – does the operation have a formal, documented rodent control programme? Rats and mice are very effective at transporting a range of diseases from site to site, and allowing those organisms to persist.

•Internal biosecurity – staff must be aware of where they have been and where they are going, particularly in multi-age operations

Fowl Cholera – other options?

In my experience outbreaks of Fowl Cholera are often preceded by a non-related stressor or precursor, such as the onset of peak production in layers, or the presence of another infective organism in the case of growing birds.

If the precursor is infection with some other type of bacteria, the occurrence and impact of Fowl Cholera can be minimised with the use of certain phytogenic products.

Fowl Cholera and “Regano”

•“Regano” is an oregano extract produced by Ralco Nutrition in the US.

•Personal experience indicates that timely use of “Regano Liquid” at the appropriate concentration can significantly reduce the level of mortality in naive (unvaccinated) flocks suffering from precursor infections, and may even have some effect once Fowl Cholera is present within a flock

•Early intervention and appropriate dose rates are critical to effectiveness

Fowl Cholera –other options?

Development of an autogenous vaccine

An autogenous vaccine is one that has been prepared from the specific infective organism present on a site.

Points to consider:

•Autogenous vaccines are specific – producers can be assured of protection (assuming manufacture, storage and administration of the vaccine has been appropriate)

•Compliance with organic standards – producers have clearly demonstrated the endemic nature of the disease, and the specific nature of the vaccine

•“Mutation” of the organism – this is the greatest argument against autogenous vaccines, and the driving force behind the development of a live, commercial Fowl Cholera vaccine.

In my limited experience, I have not seen any demonstrable change in the infective organism on a site, even on sites that have been infected for a number of years. I have seen autogenous vaccines “fail”, but have normally been able to trace these failures to inappropriate storage or administration, or even another pathogen infecting the birds.

Spotty Liver Disease

This is a disease that is particularly prevalent in non-intensive environments, and, according to Dr. Peter Scott has plagued the Australian layer industry since the late 1980's.

The actual causative agent has yet to be accurately identified, although the effectiveness of antibiotic treatments indicate some form of bacterial activity.

Spotty Liver Disease
(continued)

Whilst there is still quite a lot that is not known about this disease, the following observations provide some insight into the nature of the condition:

•Genetics – the occurrence of the disease is not necessarily related to the strain of the bird involved as it has been reported in both layer and broiler/broiler breeder flocks.

•Faecal/oral cycle – the increased prevalence of the disease in free-range and barn environments suggests that the ingestion of faeces may play some role

•Virulence – birds presented for necropsy are often in good condition, with laying birds often found with eggs in the oviduct.

Spotty Liver Disease – observations and possibilities

In working with free-range and organic layers, one recurrent observation is that of deterioration of liver quality with increasing age. There are a number of potential explanations for this, including exposure to plant derived toxins or toxins produced by micro-organisms. Whatever the reason, this observation may hold the key to some potential control strategies

Spotty Liver Disease – possibilities

Reducing exposure to bacterial loads may assist in improving liver quality and function, which may in turn reduce the potential for Spotty Liver Disease. Strategies to achieve this may include:

- Use of prebiotics and probiotics from day old to encourage optimal gut health and inoculation with appropriate gut microbes

- Strategic use of phytogenics to control targeted pathogenic bacteria

- Inclusion of organic acids in rations to assist in the control of potentially hostile gut microbes

Manipulating gut physiology

Much of what has been discussed so far in this presentation has involved the use of some form of feed additive or external influence to manage or control a disease or other problem.

I would like to take a brief look at the manipulation of gut physiology to influence health and production outcomes.

Manipulating gut physiology – coccidiosis

Control of coccidiosis in broiler flocks has most recently been achieved by the use of ionophores, an antibiotic feed additive that controls oocyst output whilst at the same time allowing for some “leakage” of infective agent to assist in the development of natural immunity in the flock

Caecal coccidiosis (Eimeria tenella) in the caeca of a fowl

Coccidiosis
(continued)

Alternative coccidiosis control methods:

- Vaccination
- Phytogenics
- Litter management
- Gizzard health

Coccidiosis

(continued)

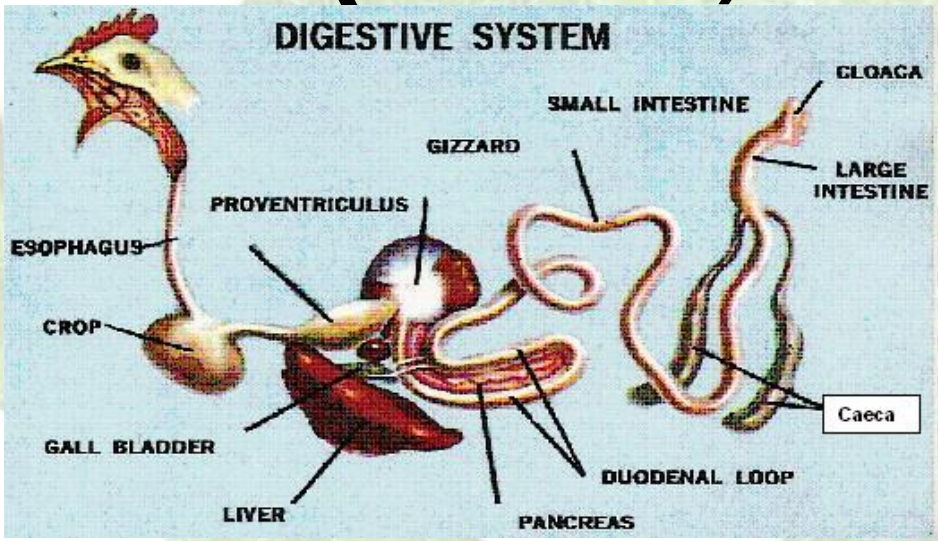
Gizzard health

This principle is based on the work conducted by the late Professor Robin Cumming and others.

Relies on the development of the gizzard to reduce the shedding of oocysts.

Exact means of control is still the subject of debate, but is likely to be related to the increased acidity created in a healthy, active gizzard coupled with the intense grinding action.

Gizzard health (continued)



The gizzard and the proventriculus (the “true” or glandular stomach of a fowl) have a unique relationship, cycling digesta between the two organs, decreasing particle size and increasing acidity.

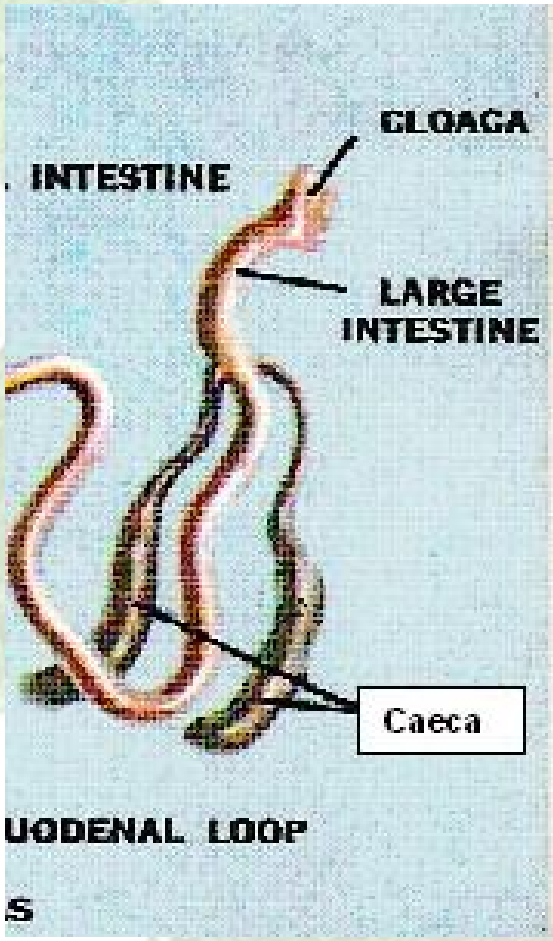
When poultry are fed a combination of whole grains and insoluble grit, the digestive efficiency of the gizzard is enhanced, because not only are the grinding muscles of the organ developed and strengthened, the sphincter muscles that control the flow of digesta in to and out of the gizzard are also strengthened

Gut physiology – the caeca

The caeca are two blind sacs that branch out from the junction between the ileum and the large intestine. Whilst there is still considerable debate about the exact function of the caeca, its presence in domestic poultry indicates that it has a specific function in these birds

Given the direct relationship between the size of the caeca and the consumption of plant materials in bird species, it is reasonable to suggest that the caeca has a role in either the digestion or at least utilisation of plant material by the bird

When this observation is coupled with the unique capacity for birds to move digesta in both directions in the digestive tract, it seems possible that this organ is still largely misunderstood within the poultry world, particularly the conventional industry



Genetics – back to the future?

The current levels of productivity achieved by commercial broilers and layers is a testimony to modern techniques of data collection, analysis and interpretation

However, every time selection pressure is made on any population – **something is lost**

What behavioural/physiological/metabolic functions have been lost or impaired in the pursuit of increase productivity or profitability?

The current crop of commercial strains available in this country are not ideally suited to extensive production systems

Genetics
(continued)

- Modern layers are susceptible to a range of behavioural dysfunctions, particularly feather picking/pulling and cannibalism

- None of the modern broiler strains available in this country are capable of meeting the current organic recommendation of a minimum 60 day growing period

- Neither of these classes of fowl can be humanely and productively managed without the inclusion of synthetic amino acids – particularly methionine. This synthetic amino acid is set to be banned from organic poultry rations in the next 3 to 5 years

Genetics
(continued)

In order for the non-intensive production sectors to flourish under the increased scrutiny of certifiers, consumers and supermarkets, there will need to be a radical change in the current paradigm associated with poultry breeding.

Hardiness, foraging ability, improved gut physiology and capacity to produce on low spec rations will need to become essential selection criteria, at the expense of optimum performance.

Conclusion

The free-range and organic poultry production sectors will necessarily come under increasing scrutiny and accountability, as compliance with standards and “truth-in-labelling” requirements become more intense and precise.

It is my opinion that the real challenge will be to develop production systems that not only accept this level of transparency, but to welcome it.

This will require the adoption of many new techniques and products, whilst at the same time embracing some long abandoned principles and practices.

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