

Symposium focuses on poultry health

Recently Alltech held their 23rd International Feed Industry Symposium in Lexington, Kentucky, USA and over 1,500 delegates from 78 countries attended. Various papers were presented in the poultry sessions and the key points from these are summarised in this review.

Maintaining small intestine integrity

by F. W. Edens et al, North Carolina State University, North Carolina, USA and University of Kentucky, Kentucky, USA.

Numerous studies have revealed a relationship between host selenium deficiency and virulence of RNA viruses. In the poultry world, there are numerous economically important RNA viruses.

Among these are the reoviruses, which are species-specific and have a broad range of virulence in chickens. Reoviruses can infect joints and tendons, the respiratory tract, and the intestinal tract.

Recently, there have been numerous field cases of enteric reovirus infections leading to malabsorption syndrome, moderate to severe weight gain depression and increased mortality.

A study was conducted to examine the influence of dietary selenium on intestinal morphology of broiler chickens challenged with an enteric avian reovirus.

This study demonstrated that the use of Sel-Plex also has a major influence on intestinal morphology that facilitates the potential for improved

nutrient assimilation for digested food (see Table 1 below).

This is especially important for chickens that might have been exposed to enteric viruses, such as the enteric reovirus that has a limited time of residence but long lasting effects on the performance of the bird.

Since the bird begins to recover from the viral infection in the gastrointestinal tract around 14 days after virus challenge, it is important to resume rapid and efficient assimilation of nutrients.

These results suggest that Sel-Plex, more so than sodium selenite, has that potential at least in reovirus infected chickens.

These observations suggest that the improvements in performance of broiler chickens fed this form of selenium can be partially explained by the improved integrity of the intestinal tract and potentially an improvement in the immune status also. ■

Table 1. Selenium and reovirus influence on morphology (mean ± SEM of villus perimeter, height, width, crypt depth, villus height: crypt depth [H:D] ratio, and muscularis externa [muscle] thickness) of duodenum in chickens at 21 days of age.

Treatment	CONTROL			INFECTED		
	No Se	Sel-Plex	Selenite	No Se	Sel-Plex	Selenite
Villus (µm)						
Perimeter	2203±102 ^b	2581±92 ^a	2256±86 ^b	2168±165 ^b	2574±115 ^a	2035±149 ^b
Height	1058±52 ^b	1206±39 ^a	1010±62 ^b	1058±99 ^b	1231±48 ^a	983±70 ^b
Width	112±7.7 ^c	113±6.6 ^c	170±11.6 ^{ab}	201±21.7 ^a	132±9.5 ^{bc}	166±9.9 ^b
Crypt depth (µm)	195±7.8 ^b	116±7.5 ^c	222±13.7 ^b	265±13.0 ^a	191±15.0 ^b	294±22.0 ^a
H:D ratio	5.43±0.46 ^b	10.37±0.88 ^a	4.54±0.39 ^{bc}	3.99±0.34 ^{bc}	6.46±0.45 ^b	3.34±0.28 ^a
Muscle (µm)	292±9.3 ^b	230±3.3 ^c	317±22.1 ^b	356±18.9 ^{ab}	414±33.1 ^a	313±10.8 ^b

^{abcd} In a row, means ±SEM with unlike superscripts differ, P<0.05

Successful control of coccidiosis

by L. R. McDougald, University of Georgia, Georgia USA.

Arsenical feed additives have been used in poultry for control of coccidiosis and enhancement of growth since the discovery of activity in this group of compounds in the years after World War II and are still in use today.

Two compounds, in particular, are in use in the USA – nitarsone (4-nitro-phenyl arsonic acid) for prevention of histomoniasis in turkeys, and roxarsone (3-nitro-phenyl-arsonic acid) for improved coccidiosis control when given in combination with the ionophorous anticoccidial drugs.

consumers has placed the future of such products in doubt.

Thus, food industries are seeking alternatives to the use of arsenicals and other products in poultry for control of disease and for enhancement of performance.

Increasingly, products based on natural products have gained favour, and considerable research has appeared in the scientific literature. One such product is Bio-Mos.

A study was undertaken to evaluate the potential of Bio-Mos as an aid in controlling losses to coccidiosis and improving performance in

Treatment	Exposure	Average live weight (kg)			Feed conversion			Mortality (%)	
		Day 21	Day 35	Day 42	Day 21	Day 35	Day 42	Total	Coccd.
Sal/BMD	No	0.875	2.007	2.488	1.032	1.512	2.181	2.67	0
Sal/BMD/Rox	No	0.863	1.959	2.455	1.032	1.535	2.198	2.33	0
Sal/BMD/Bio	No	0.823	1.969	2.482	1.082	1.513	2.139	2.33	0.33
Sal/BMD	Yes	0.689	1.868	2.237	1.184	1.572	2.347	7.33	3.33
Sal/BMD/Rox	Yes	0.698	1.837	2.333	1.252	1.536	2.155	6.33	0.667
Sal/BMD/Bio	Yes	0.716	1.919	2.441	1.131	1.563	2.221	7.33	5.33

Table 1. Performance and mortality of broilers given roxarsone or Bio-Mos for 42 days.

However, recently attention has focused on the accumulation of heavy metals in the environment and the potential for arsenic to build up in growing facilities and in soil where poultry litter is spread on the fields.

Legal action by consumer groups and a growing climate of distrust by

comparison with roxarsone under simulated natural conditions in floor pens.

Conventional medication with salinomycin was supplemented with bacitracin (BMD) as a base programme, to which was added either roxarsone or Bio-Mos for comparison.

We observed that both products had positive effects on performance of the chickens and aided in the control of coccidiosis (Table 1 above).

As could be expected, the products were not identical in their effects. The overall better growth of chickens directly exposed to coccidiosis and fed Bio-Mos, while at the same time suffering some losses to *E. tenella*, suggests that this product has some beneficial properties other than those of roxarsone.

This product also gave the best overall weight gain in birds not exposed to coccidiosis. ■

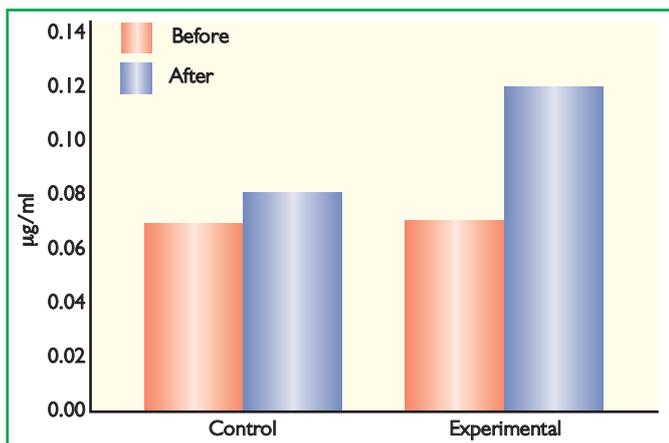


Fig. 1. Selenium concentration in plasma of volunteers consuming two eggs per day for eight weeks (adapted from Surai et al., 2004).

Possibilities for new nutraceutical foods

by T. T. Papazyan and P. F. Surai, Alltech Russia, Moscow, Russia and Alltech (UK) Ltd, Lincolnshire, UK.

Nutraceutical ingredients and functional foods are legally defined as natural substances that may be used individually, in combination, or added to food or beverages for a particular technologic purpose or health benefits.

They must have an adequate safety profile demonstrating the safety for consumption by humans. Indeed, risk of toxicity or adverse effects of many medications have led scientists and medical doctors to consider safer nutraceutical and functional food based approaches for health management.

EU approval of Sel-Plex is an important step toward improving human selenium status in Europe. A replacement of sodium selenite by Sel-Plex at 0.3ppm supplementation would double the selenium concentration in eggs (see Fig. 1), meat and milk, clearly increasing selenium consumption to the level of 60-75µg/day, a level considered to be adequate in most European countries.

Furthermore, recent research also showed that chickens will also benefit from Sel-Plex supplementation. Indeed, for broilers, selenium supplementation has been shown to improve FCR, reduce drip loss, and increase daily gain. For breeders, it has been shown to increase hatchability, fertility and quality of newly hatched chicks.

For layers, selenium supplementation has been shown to improve egg production, egg shell quality, and internal egg quality. By improving performance, Sel-Plex pays for itself, having a cost effective return on investment in a range of 1:3 to 1:8.

Thus, a 'Se-enriched' label is a 'free-of-charge' marketing tool for producers.

Indeed, an economical solution for correcting human selenium deficiency has been found. It is now just the matter of time before it will be in place worldwide.

A study conducted at the Federal University of Pelotas tested the effect of the dietary nucleotide additive NuPro on broiler performance. A total of 810 day old Ross male broiler chicks, housed in litter floor pens, were assigned to one of nine replicate groups of 30 chicks, three replicates per treatment: (T1) a corn-soybean meal control diet; (T2) control diet plus 20g/kg NuPro, 1-7 days of age; or (T3) control diet plus 20g/kg NuPro, 1-7 days of age and 38-42 days of age.

Body weight, feed consumption and feed conversion were evaluated. At trial end, one bird per treatment was euthanised and carcasses were weighed and scored.

Birds fed NuPro from 1-7 days of age showed a higher feed intake and body weight gain than control birds at seven days of age, indicating that NuPro improves performance of broiler chicks when included in a prestarter diet.

At trial end, birds fed T3 had body weight gain significantly higher than controls and numerically higher than T2 birds. Improvements in growth were less pronounced when NuPro was fed from 1-7 days of age only.

These findings are consistent with those of Leeson and Summers (2005) who found that, in general, each 1g increase in seven day old body weight improves 49 day old body weight by 5g. Birds fed diets containing NuPro also showed numerically higher carcass yields and drumstick, thigh, wing, and breast weights (not shown). ■

Trace minerals and quality meat

by C. Novak and C. Troche, Virginia Polytechnic Institute and State University, Virginia, USA.

Producers have long used preventative measures to ensure that a high yield, disease free product goes to market.

Traditionally, those preventative measures have included proper husbandry, vaccination, anti-microbial feed additives and biosecurity. The re-evaluation of current drug programmes has forced producers to place a larger focus on husbandry practices, specifically those involving nutrition.

Trace minerals are involved in metabolic processes ranging from tissue formation to overall immune function.

For this reason, the industry is revisiting trace minerals as a nutritional preventative to mortality and morbidity.

In a study of chromium supplementation of broilers, researchers surmised that inclusion of chromium led to an apparent shift in energy deposition from adipose to lean tissues (see Table 1).

Liver, breast and thigh chromium content was increased with chromium supplementation.

Furthermore, the addition of chromium ascorbic acid increased elemental chromium deposition in both breast and thigh tissue.

Carcass composition (hot carcass, carcass protein and fat, and ash) were also improved by the use of organic chromium, further enhancing carcass composition.

Meat has long been considered a dietary source of trace minerals, however, compared with red meat, poultry products contain lower concentrations.

Due to higher availability, organic minerals have the potential to allow for increased mineral incorporation into tissue.

Development of trace mineral enhanced poultry meat may allow the industry to be more competitive via designer products.

In addition, because management is beginning to overshadow drug

	Normal energy diet			P>F
	Control	Added Cr	Cr+ ascorbic acid	
Hot carcass weight (g)	697	730	751	0.04
Carcass protein (g/100g)	20.9	21.9	22.2	0.02
Carcass fat (g/100g)	4.2	3.8	3.6	0.003
Breast (g)	120	131	159	0.001
Thigh (g)	117	123	138	0.001
Water holding capacity (%)	60.8	62.9	63.3	0.008

Table 1. Carcass composition of broiler chickens fed a diets supplemented with chromium (CrCl₃ • 6H₂O) or a combination of chromium and ascorbic acid (Adapted from Ahmed et al, 2005).

Birds consuming increased levels of chromium also had lower blood glucose levels suggesting that glucose utilisation, by adipocytes and muscle cells, had become more efficient.

The inclusion of ascorbic acid was meant to increase the solubility of inorganic chromium through the formation of an organic chelate that has been reported to prevent the precipitation of chromium out of luminal contents.

programmes as a preventative measure in the maintenance of bird health, current standards of trace mineral inclusion may no longer apply to today's commercial birds.

The increased bioavailability of organic minerals may allow for more efficient incorporation of minerals into tissue, and thus correct for excess mineral excretion, alleviating potential environmental concerns stemming from increased levels of supplementation. ■

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