Symposium focuses on breeder nutrition

Alltech recently 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 those that are of particular interest to poultry breeders and hatcherymen are summarised here.

Recent developments in breeder nutrition

by John T. Brake, North Carolina State University, North Carolina, USA.

Broiler progeny performance is as an important outcome of broiler breeder management.

To evaluate vertical effects of cumulative nutrition during the pullet rearing period on performance of broiler offspring, broiler chicks were hatched from Cobb 500 broiler breeders reared on three levels of cumulative crude protein (CP) and metabolisable energy (ME) intakes (High (27,780 kcal ME and 1,485g CP), Medium (26,020 kcal ME and 1,391g CP), and Low (24,240 kcal ME and 1,296g CP)) to 22 weeks of age.

In two trials, chicks were hatched at 28 or 39 weeks of age, respectively.

Although there were no consistent, significant effects of plane of pullet cumulative rearing nutrition on broiler feed conversion or mortality to 21 days of age; body weight demonstrated an increase with increasing cumulative nutrition.

In spite of all efforts to manage flocks in such a manner as to have good uniformity of body weight, significant variation among broiler breeder males has always been present.

Thus, the largest males will often be relatively underfed and may fail to gain body weight consistently during the critical early breeding period, which has consistently caused reduced fertility, since fertility is largely a function of the number of males mating in a flock and the heaviest males must be the males that produce the heaviest broiler progeny.

Breeders must have micro-nutrients to deal effectively with the stress of restricted feeding during rearing and the females must be able to transfer sufficient nutrients to the embryo through the yolk sac during breeding.

Sel-Plex supplementation, in combination with vitamins C and E or alone, appears to function best when broiler breeders are receiving a less than adequate daily feed allocation.

As it would most likely be the largest males that exhibit reduced mating activity in the presence of such marginal nutrient intake, antioxidant therapy could result in increased broiler performance.

However, precision feeding would be required to consistently achieve such results and avoid overweight breeders that would negate any beneficial effects.

In conclusion, broiler breeder males that produce the progeny with the greatest genetic potential are the largest broiler breeder males and they must be fed in a programmed manner that achieves early sexual maturity and persistent fertility.

In addition, adequate nutrition during rearing, which prepares broiler breeder males and females to mature sexually in an optimum manner, has been shown to be required in order to obtain the best broiler performance. ■

Table 1. Effect of cumulative pullet nutrition during the rearing period on subsequent 21-day broiler bodyweight.

Broiler trial	Breeder age (weeks)	Broiler sex	Cumulative pullet nutrition		
			Low	Medium	High
			Body weight (g)		
1	28	Male	901	935	946
1	28	Female	859	873	896
2	39	Male	917	924	953
2	39	Female	871	886	870

Omega-3 fatty acids in broiler breeder diets

by Athanasios C. Pappas, Avian Science Research Centre, Scottish Agricultural College, UK.

In recent years, there has been interest in increasing the levels of the n-3 (omega 3) series of long chain polyunsaturated fatty acids (PUFA) in animal diets by adding fish oil, flax seed and other sources of n-3 fatty acids.

In recent studies it was shown that inclusion of PUFA and selenium in maternal broiler breeder diets can affect embryo viability, hatchability and growth of the progeny.

Prepeak (23 weeks) and peak (27 weeks) production breeders were fed one of four diets – a wheat based commercial breeder diet with 55g/ kg of either soybean oil or fish oil without and with added selenium as Sel-Plex. The diets were designed to contain <0.1mg/kg of selenium and about 0.5mg/kg of selenium for the non-supplemented and the supplemented diets, respectively.

The high level of fish oil included in the breeder diet increased embryonic mortality in week three of incubation and reduced hatchability and day old chick weight in hens of both ages.

However, the addition of selenium to the fish oil diets ameliorated some of these effects, because chicks hatched from eggs laid by 23 week old breeders of the fish oil and selenium treatment were heavier than those originating from breeders fed the fish oil only treatment.

The effects of maternal nutrition on the concentration of DHA of the progeny persisted for 14 days post-hatch.

During that period, chicks from hens fed diets high in PUFA had higher concentrations of DHA in the brain and liver compared with chicks hatched from hens fed diets low in PUFA.

The DHA content of the tissues of chicks from breeders fed diets supplemented with selenium was higher than that of chicks from breeders fed unsupplemented diets, indicating that supplementation of the maternal diet with selenium appears to enhance the DHA concentration of the chick brain, which may improve brain function.

It seems likely that a combination of antioxidants such as selenium and high levels of vitamin E in breeder diets might further protect PUFA in embryonic tissues compared with that of selenium or tocopherol supplementation alone.

Polyunsaturated fatty acids supplementation in breeder diets has earned its place in poultry production's future with its potential to improve flock health and disease resistance.

However, more knowledge about the ratio of n-3 or n-6 PUFA in the maternal diet and its interactions with antioxidants is still needed. ■

Evaluation of zinc for broiler chicks

by T. Ao, J. L. Pierce, R. Power, K. A. Dawson, A. J. Pescatore, A. H. Cantor and M. J. Ford, Alltech, University of Kentucky, Kentucky, USA.

A study was conducted to compare the relative bioavailability of BioplexZn (a chelated zinc proteinate) with reagent grade zinc sulphate in broiler chicks.

In addition, the requirement of zinc for optimal growth of broiler chicks in the starter phase was evaluated.

Corn-soybean meal diet without zinc supplementation, containing 23mg/kg zinc, was used as a basal diet. Day-old male broiler chicks were raised for three weeks.

Feed and water with no detectable zinc (<0.001ppm) were supplied on an ad libitum basis.

Treatments consisted of feeding the basal diet alone or with four supplemental levels of zinc (5, 10, 20 and 40mg/kg) either from BioplexZn or from zinc sulphate.

Eight replicate cages of six chicks were randomly assigned to each of nine dietary treatments.

Zinc supplementation from both sources linearly increased (P<0.01) tibial zinc. Weight gain and feed intake increased quadratically (P<0.05) with the increasing levels of zinc from BioplexZn and increased linearly with the increasing levels of zinc from zinc sulphate.

Slope-ratio analysis regressing weight gain and tibial zinc content on supplemental zinc level below the inflection points indicated the relative bioavailability values of BioplexZn compared with zinc sulphate were 183% and 157% for weight gain and tibial zinc content, respectively.

Broken-line analysis of the weight gain data determined the required supplemental level of zinc as BioplexZn was 9.8mg/kg of diet for optimal weight gain.

Thus, BioplexZn provides a powerful tool for reducing the environmental effects of poultry production, while maintaining optimal animal performance. ■

Zinc source	Added Zn (mg/kg)	Feed intake (g)	Weight gain (g)	Total tibial Zn (µg)	Liver Zn (µg/g dry weight)
Basal	0	886	669	286	66.4
BioplexZn	5	948	722	423	71.1
	10	973	750	548	74.8
	20	956	732	710	74.6
	40	948	734	783	76.4
Zinc sulphate	5	933	713	353	70.5
	10	951	730	469	71.5
	20	963	751	649	76.3
	40	973	760	795	79.4
Pooled SEM	-	13	12	20	1.5

Table 1. Performance and tissue zinc (Zn) content of chicks fed BioplexZn and zinc sulphate in a corn-soybean meal diet.

Broiler breeder impacts on progeny

by Loek L. M. de Lange, De Heus Feeds BV, BJ Ede, The Netherlands.

Studies regarding the relationship between maternal performance and immunity in broiler breeders and the impact on their progeny are not often conducted.

Mannanoligosaccharides have been shown to bind certain types of pathogenic bacteria. The binding of pathogens influences the immune system via gut-associated lymphatic tissue. The following trials were conducted:

- **Breeder trial.** To examine the benefits of Bio-Mos supplementation on the performance of broiler breeder hens, egg quality and hatchability and subsequent performance of chicks produced from those breeders.
- **Broiler trial.** To examine the carry-over effect of the Bio-Mos in the breeder diet and to examine the effect of a starter diet supplemented with or without Bio-Mos on performance, immune status and economics.

Economic comparisons of the breeders fed Bio-Mos showed a much higher financial return compared with the control flock.

Eggs from the parent stock fed Bio-Mos had a proportionally larger ratio of yolk:egg white, which may be related to the improved levels of viable chicks at hatch (Table 1).

Adding Bio-Mos to a starter feed resulted in higher weights at slaughter and a higher financial return compared with the control flock.

Analysis of the Ig titers against NCD demonstrated that the best immune response was obtained in broilers sourced from Bio-Mos supplemented breeders that received Bio-Mos in starter feed.

For commercial purposes and animal welfare reasons, these finding are important as they relate to the successful production of viable broiler eggs from parent stock breeders, as well as enhancing the robustness of progeny immune response.

Further work is necessary to show that the immune status of the young broiler chicken can be improved by using Bio-Mos in the breeder feeds by analysing the IgY in the egg yolk. ■

Hatching parameter	Control	Bio-Mos
Infertile eggs (%)	5.3	3.7
Embryo mortality (%)	4.7	3.3
Non-viable chicks (%)	3.0	2.3
Viable chicks (%)	87.0	90.7

Table 1. Hatchability of eggs of hens supplemented with Bio-Mos compared to those of a control diet.

Table 2. Effect of feeding Bio-Mos in starter feed on the performance of broilers to 36 days.

Performance parameter	Control starter feed	Starter feed containing Bio-Mos
Average daily gain (g)	59.4	61.0
FCR	1.579	1.573
Mortality (%)	5.7	5.7
Live weight (kg)	2.139	2.196
FCR at 2kg LW	1.537	1.514
Feed cost €/2kg LW	0.633	0.627