Brazilian breeders reap the benefits of organic minerals with more chicks

Alltech recently held their 21st Annual Symposium entitled Nutritional Biotechnology in the Feed and Food Industries in the USA.

In a major paper at this event Fernando Rutz and colleagues from Brazil looked at the use and benefits of selenium in the form of Sel-Plex and other organic minerals in broiler breeders.

This was done against a backcloth of what has happened in recent times.

Modern broilers grow at 4.6 times the rate of a typical 1957 bird and of this improvement some 85-90% is due to genetics and just 10-15% because of better nutrition. In addition, modern broiler breeders are expected to peak at around 85% egg production and to produce 150 chicks to 64 weeks of age.

Today's bird, be it at breeder or broiler level, can not just be relied on to eat what it requires as it will tend to over consume.

Thus, feeding management is important. In their paper Fernando Rutz and his colleagues focused on improving broiler breeder performance by using organic minerals. A series of field trials was undertaken that involved several commercial companies. In these trials breeders (hens and cockerels) received feed that was supplemented with Sel-Plex and Bioplex Zn and Bioplex Mn.

In the first trial some 16,000 Cobb breeder hens were divided into three groups. The control group received 0.3ppm selenium as sodium selenite and 100ppm each of zinc and manganese from inorganic sources. Two test flocks housed in two different facilities received the same diet, except the selenium (0.3ppm) was provided as Sel-Plex and 30ppm of zinc and manganese were provided as the respective Bioplex products.

The results of this trial, in which the feeds were fed from 23 to 68 weeks of age, are summarised in Table 1.

In a second trial, conducted by the same integrator as the first trial, 30,000 Ross females were involved. The mineral inclusions were the same, with the exception that the selenium supplied as Sel-Plex was added at a 0.2ppm level.

These diets were fed from 23 to 66 weeks of age and the results are summarised in Table 2.

In a third trial 18,000 Hybro breeders were used and divided into two groups of 9,000 each that were housed on different farms. The mineral levels were as in the first trial and the diets were fed from 23 to 52 weeks of age.

In a fourth trial Cobb broiler breeders were fed the same mineral levels as the Ross breeders in the second trial from 23 to 44 weeks of age and the results of this trial are shown in Table 4.

In these four trials the use of Bioplex + Sel-Plex resulted in 3.26, 2.91, 2.72 and 2.05 extra chicks per hen. ■

	Bioplex + Sel-Plex		Control
Facility	**A**	**B**	**C**
Viability (%)	87.01	85.69	86.29
Peak egg production (%)	82.96	83.83	82.81
Total egg prod. per hen housed	197.59	197.34	194.53
Settable eggs per hen housed	187.13	185.79	182.57
Chicks per hen housed	157.19	156.06	153.36

Table 1. Broiler breeder data from the first (Cobb) trial.

Table 2. Broiler breeder data from the second (Ross) trial.

	Bioplex + Sel-Plex	Control
Egg production per hen housed	182.31	179.81
Settable eggs per hen housed	171.58	168.12
Chicks per hen housed	144.13	141.22

Selenium

Selenium is often found in association with sulphur in inorganic and organic compounds. Common forms of selenium are selenic acid, selenates and selenites. Some plants and micro-organisms have been able to replace the sulphur in cysteine and methionine with selenium, to produce selenocysteine and selenomethionine.

Selenomethionine is absorbed from the digestive tract by an active transport mechanism similar to that involved in the transport of methionine, while inorganic selenite and selenocysteine are not actively transported. Once absorbed, inorganic selenium binds to selenium-binding proteins. Inorganic selenium is retained at a much lower concentration in muscle than its organic counterparts. In addition, the organic selenium in Sel-Plex is more effectively transferred from the diet of the broiler breeder to the egg and, hence, to the tissues of the chick.

Selenium is an essential component of glutathione peroxidase, an enzyme that protects cellular contents and sub-cellular membranes from oxidative damage. Vitamin E is a specific lipid soluble antioxidant in the membrane, whereas selenium functions as a component of glutathione peroxidase that destroys peroxides before they can do their harm.

Selenium also plays a role in RNA as it can be incorporated into purines and pyrimidine bases. It may have a role in prostaglandin synthesis and essential fatty acid metabolism, it is needed for the generation of an adequate immune response and it is important in the activation of thyroid hormones.

A selenium deficient diet reduces hatchability and the resulting chicks are weak.

	Bioplex + Sel-Plex	Control
Egg production per hen	127.57	124.55
Mortality (%)	4.61	4.06
Hatchability (%)	84.84	84.54
Chicks per hen housed (at 49 weeks)	81.77	79.05

Table 3. Broiler breeder data from the third (Hybro) trial.

	Bioplex + Sel-Plex	Control
Mortality (%)	2.49	4.06
Egg production per hen (at 44 weeks)	97.33	96.56
Hatchability (%)	85.65	85.57
Chicks per hen (at 39 weeks)	58.81	56.76

Table 4. Broiler breeder data from the fourth (Cobb) trial.

Manganese

Manganese is a functional component of many enzyme systems including those involved in carbohydrate, protein and lipid metabolism.

Manganese is also a component of the matrix of bone and, as such, is required for normal bone development.

A deficiency of manganese results in reduced hatchability and embryonic abnormalities. The breeder can tolerate a lack of manganese supplementation for up to a month with no adverse effects on hatchability.

Zinc

Zinc is a transitional metal that exists in a unique oxidative state, which allows it to function as a structural element in enzymatic proteins or as a co-factor in enzyme activity.

This metal is a functional component of enzyme systems involved in growth, digestion and respiration and low levels of zinc are needed in breeder diets to obtain normal hatchability.

A zinc deficient breeder diet results in depressed hatchability, increased embryonic mortality and impaired development of the skeleton and feathers. Various embryonic abnormalities have been attributed to zinc deficient breeder diets.