Improving breeder hen performance following consumer demand

There is a clear trend of continuous genetic progress in broiler and layer breeders. With a deep focus on flock management, hen and progeny health status and use of high performing, tailor-made nutrition technologies, producers and nutritionists are trying to raise production performance on breeder farms and in hatcheries.

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Parameters	Hy-line Brown (Russia)	Hubbard GGP male line (France)	Novogen White (Holland)	Ross 308 (Belgium/Holland)
Control: inclusion level of Zn:Cu:Mn – ITM/OTM (ppm)	103:24:113	100 : 10 : 100	64/11:13/2:58/12	100:15:100
MMHAC: inclusion levels of Zn:Cu:Mn (ppm)	50 : 10 : 60	56:14:56	50:10:65	50:10:65
Trial period (hen age in weeks)	43-52	21-53	25-52	20-60
Number of hens/flock	11,600	3,800	4,100	43,000
Improvements with MMHAC vs Control = 100%			**REDUCE AND REPLACE**	
Hen mortality (%)	100.0	84.4	85.8	100.0
Day-old pullets (%)	106.8	107.8	105.3	100.8
FCR/day-old pullet	96.3	94.0	96.7	95.5

Table 1. Programme and performance results obtained with MMHAC in different field observations in broiler/layer breeders.

Given the shift in consumer demand towards more further processed products, breeder management has to stay up-to-speed, providing the highest quality chicks and best end product. To what extent can trace elements such as zinc (Zn), copper (Cu) and manganese (Mn) affect flock effectiveness and how important is the form in which these minerals are used?

The most appropriate trace mineral supplementation for breeder hen efficiency

The success of a breeder hinges on the ability to consistently produce high-quality day-old chicks in optimal health status for growth and development.

As genetics have evolved and dramatically increased the performance of broiler and layer breeders, a higher quality nutritional programme has become a need to help birds achieve this genetic potential.

As a result, nutritionists have the responsibility to ensure not only optimal health and productivity of the flock, but also provide high quality eggs and subsequent chicks.

Trace minerals such as Zn, Cu and Mn are essential to ensure adequate performance of the animal, both as enzyme co-factors and as constituents of metalloenzymes. Supplementing breeder hen diets with chelated sources of trace minerals has been shown to enhance bone and tissue strength, support healthier feathers and wound healing, improve bird livability, and strengthen the immune system, raising the bird's defensive capacity against oxidative stress. All of this leads to a higher rate of lay, more hatchable eggs and improved progeny quality.

Use of highly bio-available metal methionine hydroxy analogue chelated Zn, Cu and Mn (MMHAC, Mintrex chelated trace minerals, Novus Int), allows nutritionists to also reduce the total supplemental trace mineral level in the feed, while still meeting the animal's nutritional requirements and improving key production parameters.

Higher value broilers, all starts with more viable chicks

Over the past several years, various studies have been conducted in broiler and layer breeders evaluating bird health, performance and egg quality when supplemented with MMHAC versus inorganic trace minerals or a combination of the two. In all studies, Novus's unique reduce and replace (R&R) strategy was utilised when formulating diets.

The concept behind this strategy is that you can take out some or all of the inorganic trace minerals in a diet

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Fig. 1. Effect of different forms of Zn, Cu and Mn on hatchability %, in relation to hen age and the storage length of the eggs.

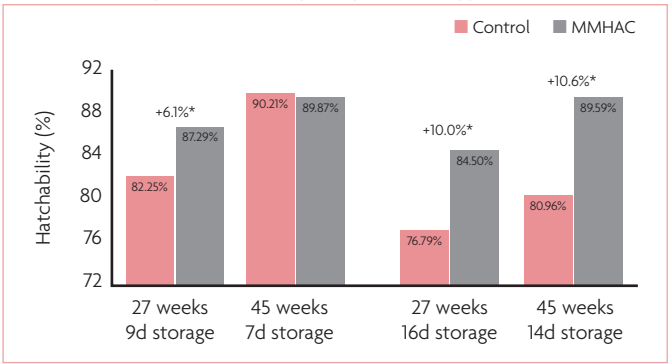
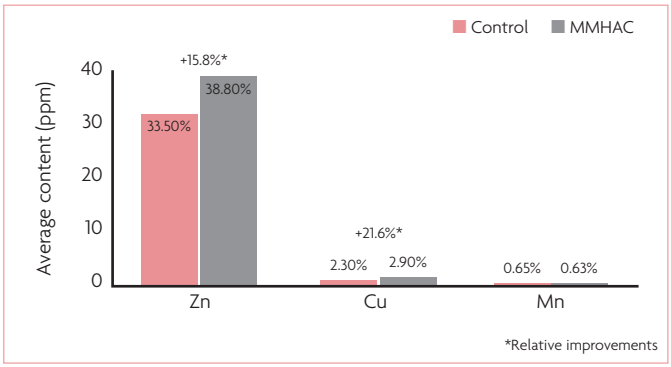


Fig. 2. Average content of Zn, Cu and Mn in the egg yolks (ppm) of eggs taken from hens at 42, 57 and 77 weeks of age. The level of Mn in yolk is very low and is not subject to modification due to the change in form or level used in the feed.



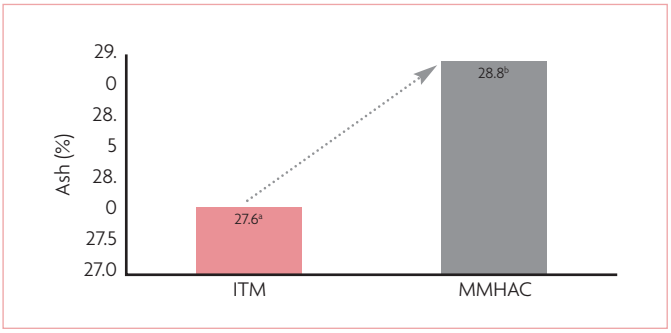


Fig. 3. Significant increase of % ash on DM from feeding the MMHAC R&R programme to the breeder hens, in comparison to supplementing the diet with inorganic trace minerals (ITM).

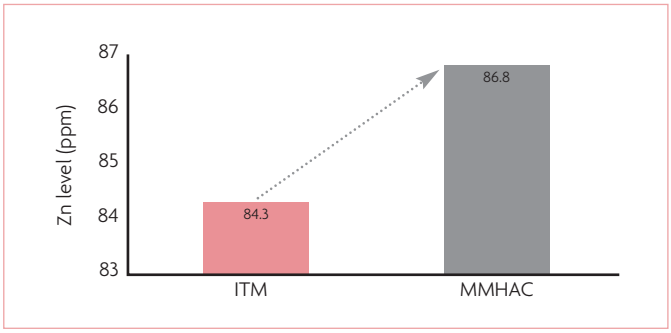


Fig. 4. Increase of Zn level (ppm) based on DM from feeding the MMHAC R&R programme to the breeder hens, in comparison to supplementing the diet with inorganic trace minerals (ITM).

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and replace those with lower levels of MMHAC and still achieve the same or better performance. As diets were balanced, the methionine contribution from Mintrex trace minerals was taken into account and total sulphur amino acids were adjusted accordingly.

A summary of findings in some of the aforementioned trials can be found in Table 1.

In the trial carried out in the Novogen White layer breeder flocks, great emphasis was placed on the effect of mineral source on total number of hatched chicks in relation to the storage length of the eggs.

The assessment was done twice during the study period, in total 2,400 eggs were collected at 10 and 28 weeks after the start of the trial (hen age 27 and 45 weeks respectively). During incubation, the eggs were first candled to identify clears versus dead embryos: higher fertility and lower embryo mortality was noticed in the MMHAC group (Fig. 1).

This benefit became especially visible when the eggs were stored for a longer time (up to 35% lower).

As a result, eggs from hens supplemented with MMHAC had a higher hatchability percent (Fig. 1).

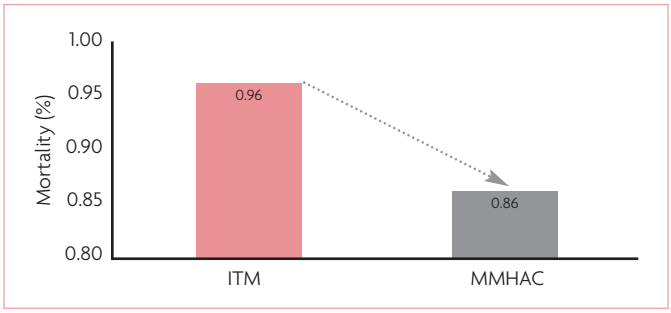
Another parameter that was assessed within the Lohmann Brown breeder flock was final chick quality. It is well accepted that when a higher plane of nutrition is provided to the hen, such as by feeding more bioavailable minerals, their progeny will also benefit. The mineral content in the egg yolk is a good indicator of nutrient transfer from hen to chick. The Lohmann study demonstrated that when using the reduce and replace strategy with MMHAC, significantly higher levels of zinc and copper are observed in the egg yolk (Fig. 2).

Another study conducted in heavy broiler breeders (Hubbard) in France evaluated the impact of trace mineral source supplemented on mineralisation level of tibia bones of day-old chicks, based on its crude ash and Zn content. The significantly higher level of ash found in the tibia of chicks originating from hens supplemented with MMHAC (P = 0.02; Figs. 3 and 4) suggests a stronger skeleton which is associated with fewer locomotion problems later in broiler production.

A study was conducted on Ross 308 breeders in The Netherlands in cooperation with one of the largest hatchery groups in the European Union. The study used seven-day mortality rate of the progeny as an indication of chick health.

Approximately 43,000 hens received the more bioavailable MMHAC from 20-60 weeks of age which led to a higher number of viable chicks compared to the results the hatchery group achieved with their usual ITM programme (Fig. 5). These findings demonstrate that supporting breeder hens with a unique source of highly bio-available Zn, Cu and Mn not only ensures better performance of the birds, but also positively impacts their progeny health and quality for a better start of the broiler production that follows.

Fig. 5. Lower average % mortality following the MMHAC R&R programme compared to the standard inorganic trace mineral (ITM) supplementation.



Summary

Trace minerals such as zinc, copper and manganese play an essential role in maintaining healthy and productive breeder hens.

Supplementing breeder diets with Mintrex chelated trace minerals (MMHAC) optimises egg production and hatchability up to 80 weeks of age when compared to other organic and inorganic mineral sources.

Additionally, due to higher bioavailability and utilisation by the animal, egg yolks contain an optimised amount of minerals which are available for the developing chick to utilise for structural growth, system development and viability.

Thanks to a well researched, well-founded reduce and replace strategy, Mintrex trace minerals achieve these effects at lower supplementation levels than inorganic sources, eventually resulting in a higher final total profitability of breeder operations, while also reducing the environmental impact of production. ■

References are available from the author on request