

How to avoid the risks of hairline cracks and contamination

Chickens face many challenges throughout their lives. Incidentally, the first day is one of the most stressful and has the highest impact on long-term animal health, welfare, performance, sustainability, and food safety. Even before the egg is laid, the hen's nutrition is key to developing resilient and vital day-old chicks.

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Hatcheries are crossroads where day-old chicks from different origins are in contact with each other, increasing the risk of cross-contamination. Even with the most stringent biosecurity programme, the performance of hatcheries strongly depends on the quality of the hatching eggs. Since chicks are the potential of the farms, it is the goal of any broiler breeder and hatchery manager to efficiently produce as many healthy and active day-old chicks as possible.

Hairline cracks are open doors for contamination

An effort is being made to prevent microbial-contaminated eggs from entering the hatchery. One way to do this is to ensure there are no hairline cracks or star cracks.

One study has shown that even minimal defects of the eggshell significantly influence hatchability and day-old chick quality in broiler

breeders. When cracks are present, there is an increased risk of eggs becoming contaminated with *E. coli* or salmonella. One study found that the rate of contamination with hairline cracks can be at least five times higher than in normal eggs.

The impact of contamination lasts longer than a day

In a large field trial under commercial conditions when hairline cracked eggs were compared to normal eggs, the effect on hatchability and day-old chick quality found that hairline cracks decreased broiler performance in a significant way. One study found hairline cracks negatively affected mortality, feed intake, weight gain, and feed conversion. Other studies have seen decreased effects on performance, directly affecting profitability and detrimentally impacting food safety.

More calcium is not the solution

As the hen ages, due to a reduction of shell thickness and shell breaking strength, the incidence of these types of eggshell defects increases. However, in contrast to what many people believe, adding additional calcium to the diet to maintain shell strength is not the solution.

Under normal circumstances, the calcium uptake rate is not affected by the hen's age or the quantity of calcium available in the diet. In fact, increasing calcium levels above the recommended intake can even have

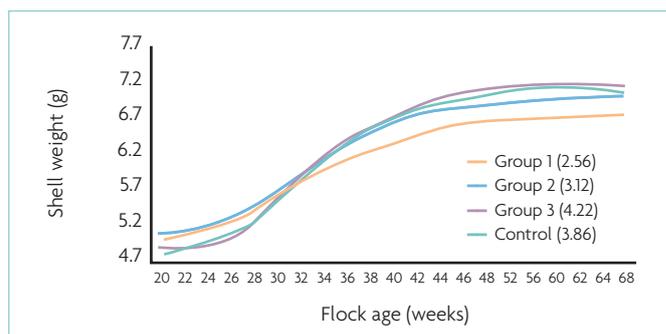


Fig. 1. Evolution of shell weight in relation to flock age (commercial layers, four different feed formulations) (Negoita et al., 2017).

negative effects on shell quality. Also, it is clear when given a certain calcium rate, shell weight becomes constant after reaching maximum egg output; indicating that calcium deposition is constant in time (Fig. 1).

Supporting shell deposition

Given the shorter intervals between ovulation and oviposition (as performance improves year by year), facilitating and improving the process of shell calcification results in the best possible improvements.

To guarantee success as hens age, it is evident that the strategy to maintain egg quality needs to be built on improving not only calcium but shell deposition.

Protecting protein is the key

When a hen is not stressed, more protein can be attributed to production as well as the quality of the eggs; especially the albumen. Medium chain fatty acids have been shown to improve the shell strength and the nutrients available to young chicks through the albumen, which results in higher hatchability and better chick quality.

In this regard, Agrimprove conducted several trials using Shellbiotic on broiler breeders close to 60 weeks old. Shellbiotic was found to be helpful in improving egg production and quality as well as reducing hairline cracks to improve hatchability.

These results indicate less microbial contamination, maintained albumen quality, and better liveability in day-old chicks (Table 1).

The trial results in Table 1 show what happens to embryos in the hatchery matters not just for their immediate welfare, but also for later growth in the first week. This suggests Shellbiotic has a positive effect on poultry production.

The impact is evident

In conclusion, day-old chicks face tremendous stress in the first 24-72 hours after hatching. In addition to these stressors, they are bombarded with potential contaminants.

Studies have shown that improving shell strength reduces hairline fractures, supports chick vitality, and improves later-life efficacy. Most broiler breeder diets provide adequate calcium, meaning the shell strength solution is not in adding calcium to the diet but in supporting albumen quality and shell disposition.

On average, broiler breeder and hatchery managers using Shellbiotic notice improvements in the number of hatching eggs (1.5-2.5) and hatchability (1.0-1.5%); resulting in 2.5-3.0 more first-grade day old chicks. By looking to shell disposition and albumen quality, producers achieve fewer hairline cracks indicating more vital and sustainable day-old chick production. ■

References are available from the author on request

Table 1. Average economic values in broiler breeders.

	Control	Shellbiotic	Difference
Average lay (%)	61.17	63.18	+2.01
Second grade eggs (%)	2.45	2.29	-0.16
Mortality (%)	3.80	2.70	-1.10
Haugh unit	63.33	67.44	+4.11
Hatchability (%)	80.28	81.26	+0.98
Hair crack eggs (%)	13.96	10.67	-3.29