Fortibac® and its effect on intestinal health, performance and quality of eggs in layers

Fortibac® is a preparation based on the optimal combination of monoglycerides of selected fatty acids. Its action is mainly targeted at the intestinal microbiome, intestinal epithelium and immune system.

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The intestinal microbiome includes all microorganisms inhabiting the gastrointestinal tract. Fortibac® optimizes the intestinal microbiome – it suppresses pathogenic bacteria (e.g. pathogenic strains of *E. coli, Clostridium perfringens, Salmonella Enteritidis, Campylobacter jejuni*), and at the same time supports beneficial bacterial species (e.g. bacteria of the genus *Lactobacillus* and *Bifidobacterium*). Its action is thus broader than that of antibiotics, which suppress both beneficial and non-beneficial bacteria, and often cause intestinal dysbiosis. The antibacterial action of Fortibac® is manifested in several stages and involves increasing the permeability of the bacterial membrane, disrupting the metabolic functions of the bacterial cell and affecting the bacterial cell cycle. The risk of developing resistance is thus negligible.

The intestinal epithelium is absolutely essential both for the processes of digestion and absorption of nutrients, and for protection against the action of undesirable agents such as bacteria and toxins. The components of Fortibac® are a direct source of energy for enterocytes, they have a positive effect on the new formation of blood capillaries and promote the integrity of the intestinal wall by increasing the synthesis of *tight-junction* proteins. The beneficial effect of the product is in principle demonstrated in young animals, where it supports the development of the intestinal tract. The result is longer intestinal villi and shallower intestinal crypts and an overall longer and heavier digestive tract, which makes the processes of digestion and absorption of nutrients more effective. Fortibac® also increases the secretion of digestive juices and optimizes the time of passage of digestion through individual parts of the digestive tract. In older animals, it accelerates the regeneration of the intestinal lining damaged by infectious and other insults. Increasing the integrity of the intestinal wall is the prevention and therapy of the syndrome of increased intestinal permeability. This syndrome has recently become a more common health issue, leading to the penetration of bacteria and toxins into the bloodstream, resulting in a pro-inflammatory condition and poor performance.

The immune system provides protection against infection. However, its undesired activation leads to a pro-inflammatory condition and reduced performance. More than two thirds of the immune system cells are located in the intestine, and thus Fortibac® supports the intestinal immune system by its beneficial effect on the intestinal microbiome and intestinal epithelium. The action of the product is modulating again - it prevents excessive or undesired

stimulation of the immune system and supports the desired response of the immune system against the pathogen. In cases where the immune system responds to non-pathogenic bacteria or food components, Fortibac® stops this response by affecting the production of cytokines. By contrast, Fortibac® supports the reaction to pathogenic bacteria (again through the production of cytokines), and it also has an antibacterial effect. The result is anti-inflammatory action, increased resistance to infectious diseases and increased vaccination efficiency.

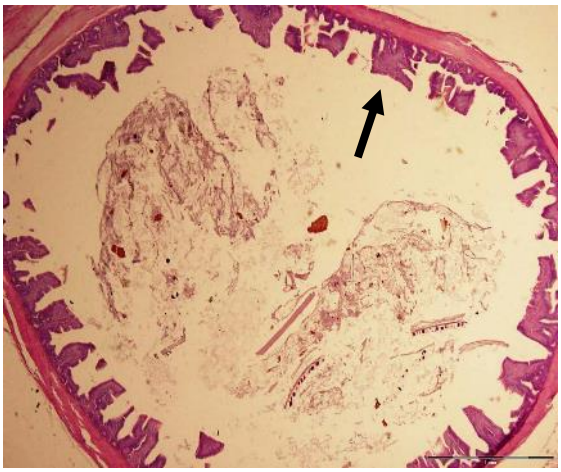
Effect of Fortibac® on intestinal health

Intestinal health is a prerequisite for good productivity and profitable poultry production. It is mainly affected by nutrition, environment and the presence of infectious agents. Optimal intestinal health is morphologically manifested by long intestinal villi and shallow intestinal crypts and longer intestines. It is precisely these effects that Fortibac® exhibits, as described in the opening section to this article.

In the framework of the histopathologic experiment, the height of the poultry villi was assessed. The Fortibac® group showed 10.3% higher villi than the control group.

FIG. 1: Histopathological sections showing the height of intestinal villi (see arrow) in the control group (1) and in the Fortibac® group (2).

(1)



(2)

Effect of Fortibac® on performance

By having an effect on intestinal health, Fortibac® increases the absorption of nutrients, and thus efficiency. It improves growth performance, feed conversion rate and carcass quality. The effect on growth and quality of carcasses is manifested especially in broilers. Fortibac® also reduces feed conversion in broilers and laying hens.

Scientific and field testing was performed to determine the effect of the product on the performance of broilers and laying hens. Fortibac® was administered at a dose of 700 ml/1,000 l of water. During the observations in the period from 2012 to 2019, the negative effects caused by the *Clostridium perfringens* bacteria were attenuated in broilers and the performance parameters improved (graph 1).

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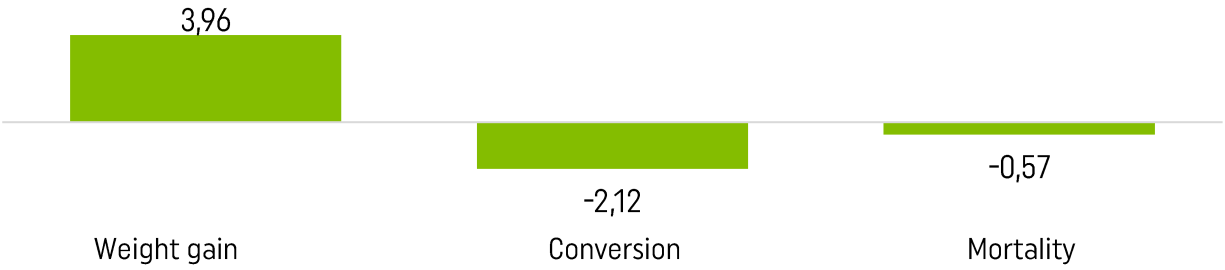
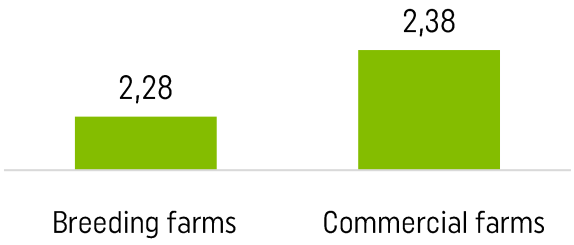
GRAPH 1: Improvement of the performance parameters (%) of broilers in Fortibac® experimental group versus the control group



Fortibac® was tested on 340,000 hens with 247,000 located in commercial farms and 93,000 in breeding farms. The dosage of the preparation was set at 700 ml/1000 l of water or at 700 g/l of feed. On farms, a positive effect on egg production was evaluated, with laying up to 2.38% higher in the experimental groups. At the same time, reduced mortality was observed in the groups using Fortibac® compared to control groups (*graph 2 and 3)*.

GRAPH 2: Improved egg production (%) in Fortibac® experimental groups vs. control



GRAPH 3: Decrease in average relative mortality percentage of hens in Fortibac® experimental groups compared to control

The effect of Fortibac® on the production of hens during the period of heat stress risk was also assessed. Egg production in the hall with Fortibac® was on average 1.8% higher from week 22, and during the period of heat stress there was no large fluctuation in laying as there was in the control groups (*graph* 4). At the beginning of the product administration, mortality of hens in the house with Fortibac® was slightly higher than in the control house. After approximately two weeks of application, however, mortality in the experimental house stabilized and remained significantly lower, even during tropical temperatures (*graph* 5). This is consistent with the results in the literature, where in an experiment with cockerels exposed to heat stress, components of Fortibac® increased total intestinal and intestinal mucosal weight, intestinal villi height and surface and numbers of beneficial bacteria, while reducing heat stress-induced intestinal mucosal damage and endotoxin permeability.

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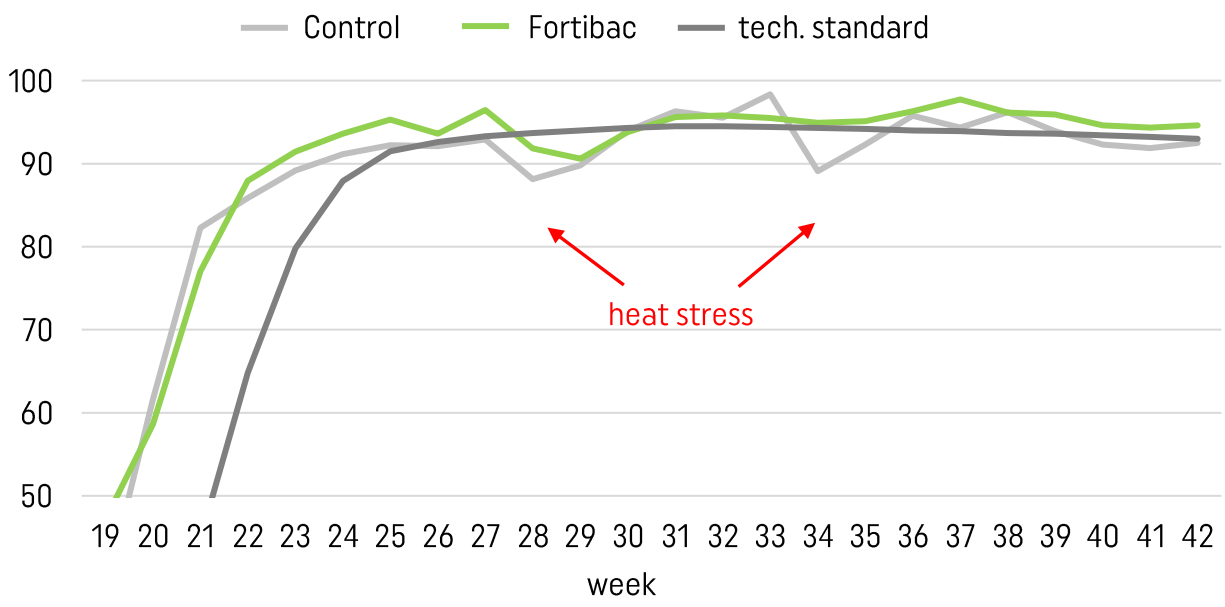
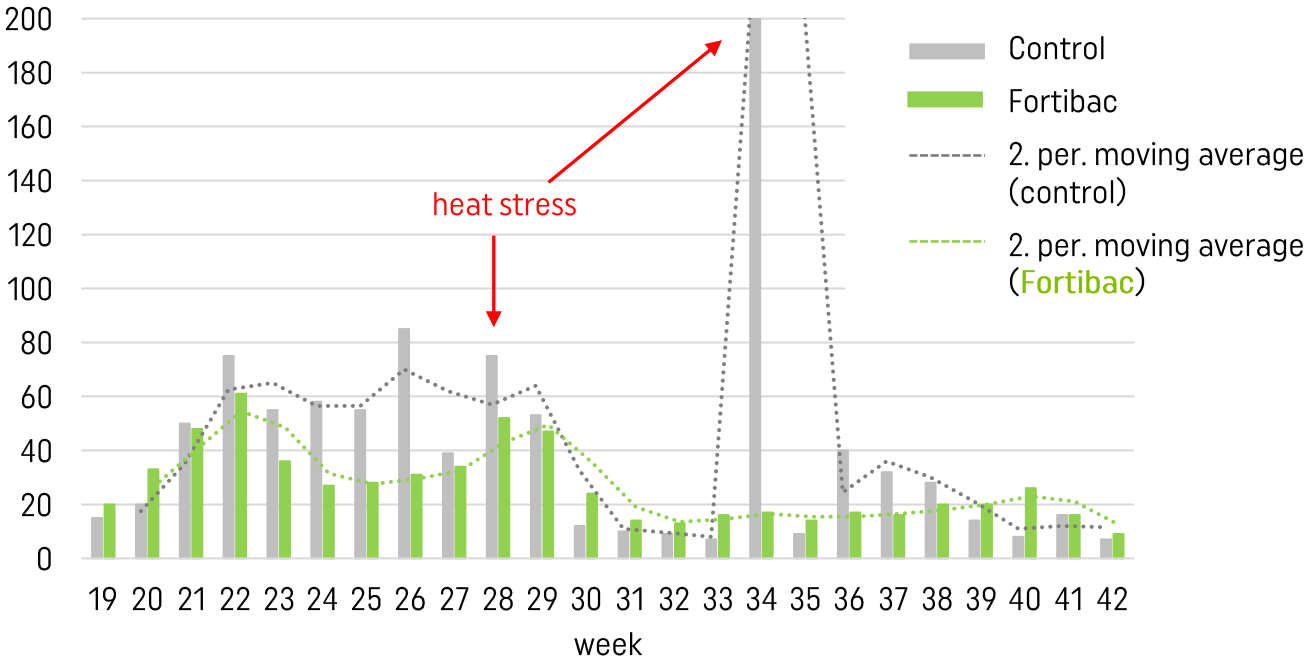
GRAPH 4: Effect of heat stress on egg production (%) in the Fortibac® experimental group and the control group



GRAPH 5: Effect of heat stress on hen mortality (animals/week) in the Fortibac® experimental groups and the control groups



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Effect of Fortibac® on egg quality

Among other things, Fortibac® optimizes the absorption of calcium and phosphorus from the intestines. It increases the production of eggs, their weight and improves the quality of the eggshell. In older laying hens, the intestinal villi of the duodenum shorten and the absorption of nutrients is thus reduced, which leads to poorer quality of the eggshell. Fortibac® prevents these changes - it supports the regeneration of the intestinal epithelium of the duodenum and maintains the normal length of the intestinal villi. By optimizing mineral metabolism, the number of abnormally shaped eggs is also reduced and osteoporosis is prevented.

In a 2019 study, it was also found that administration of the components of Fortibac® to hens in breeding farms resulted in hatching of chickens with a stronger immune system (increased levels of IgA, IgM, IgG, lysozyme and β- defensin in serum), higher live weights on days 1, 7 and 28, with longer tibia and better bowel condition (with higher overall length, optimal jejunal morphology and higher number of IgA positive cells). The control group was a group of chickens medicated with ciprofloxacin after hatching.

Conclusion

The optimal combination of monoglycerides of selected fatty acids in Fortibac® has a positive effect on the intestinal microbiome, intestinal epithelium and immune system. The above results demonstrate that Fortibac® has been shown to improve intestinal health, performance parameters and egg quality and, in line with increasing pressure to reduce antibiotic consumption, offers effective solutions to quality and economic parametres of production.

Bibliography is available from the author

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