

SUPPLEMENTATION WITH ALGÆ (CHLORELLA-SPIRULINA) AND SORBITOL IN POULTRY INTENSIVE FARMING

Intensive farming involves, as known, need to strengthen poultry immune defenses and maximize performances. Intestinal health has an enormous impact on immune response quality and of course, plays a key role in optimizing feed consumption, therefore in growth performances.

Among many different supplementation aimed to obtain better products from livestock, algae and algae by-products have been tested. Research evidence so far has shown that the inclusion of microalgae in animal diets could improve growth and meat quality in poultry (4). A field study involving 480 broiler chickens showed how feed supplementation with Chlorella by-product improved body weight gain in a statistically significant manner. Likewise, plasma concentration of IgG, IgM and IgA were increased while caecal content of *Escherichia coli* and *Salmonella* were decreased and *Lactobacillus* concentration villus height were increased (1). Similar results were obtained in a study undertaken to investigate the effect of dietary supplementation of Chlorella to replace antibiotics in the diets of broiler chickens, where *Lactobacillus* intestinal concentration was increased, together with plasma IgA, IgG and IgM concentration (5). In another field study performed on 1050 broiler, dried Chlorella powder was tested as feed supplement: results indicated a better body weight gain and an improved humoral immune response in treated group (2). An investigation carried out on broiler post hatching holding time showed how a 1% Chlorella feeding was useful improving immune response and decreasing the abdominal fat content of broilers (3). Similarly, Spirulina as diet supplement can exert a positive effect on poultry immune system, promoting macrophages phagocytic potential, significantly increasing NK-cell activity and increasing IgG concentration, while lowering total intestinal coliform concentration: these findings suggest that Spirulina dietary inclusion may enhance disease resistance potential in poultry (6, 9).

A study performed on heat-exposed broiler, supplementation of the diet with Spirulina decreased concentration of stress hormone and some serum lipid parameters while enhanced

humoral immunity response and elevated antioxidant status whereas didn't meaningfully affect performance characteristics; nevertheless, feed conversion ratio was numerically improved in broilers fed with 1% Spirulina under high ambient temperature (7). Even in balanced environmental conditions, Spirulina supplementation significantly increased body weight gain, decreased feed conversion rate and increased villi height (8), results proven in several other studies (10, 11). Beside these novel functional supplements, the role of sorbitol in broiler diet has to be reminded as it can lower serum glucose, total cholesterol and very low density lipoprotein concentrations, while significantly reducing and relative weights of abdominal fat (13). Recently, an in vivo study was conducted to determine effect of dietary sorbitol on growth performance, plasma α 1 acid glycoprotein (AGP) and ceruloplasmin concentrations in male broiler chicks during immunological stimulation due to injections with *Escherichia coli* lipopolysaccharide (LPS): it was demonstrated how dietary sorbitol was effective in preventing loss of body weight following injection of LPS, moreover plasma ceruloplasmin concentration on days 2 and 6 after the immune stimulation in chicks fed the sorbitol diet was significantly lower than that in chicks fed a glucose diet. These results indicate that dietary sorbitol reduces early inflammatory responses and tends to prevent the reduction of growth due to repeated injections of LPS. These findings suggest how a mixed supplementation of Chlorella, Spirulina and Sorbitol may positively affect broiler performance and improve immune system response.



Bibliography

1. J Anim Physiol Anim Nutr (Berl). 2017 Apr;101(2):208-214. doi: 10.1111/jpn.12566. Epub 2016 Nov 17.
2. Springerplus. 2016 Jun 14;5(1):718. doi: 10.1186/s40064-016-2373-4. eCollection 2016.
3. Sugiharto, S., and Charlotte Lauridsen. "Dietary Chlorella supplementation effect on immune responses and growth performances of broiler chickens exposed to post hatch holding time." *Livestock Research for Rural Development* 28.7 (2016).
4. Madeira, Marta S., et al. "Microalgae as feed ingredients for livestock production and meat quality: A review." *Livestock Science* 205 (2017): 111-121.
5. Kang, H. K., et al. "Effect of various forms of dietary Chlorella supplementation on growth performance, immune characteristics, and intestinal microflora population of broiler chickens." *Journal of Applied Poultry Research* 22.1 (2013): 100-108.
6. Qureshi, M. A., J. D. Garlich, and M. T. Kidd. "Dietary Spirulina platensis enhances humoral and cell-mediated immune functions in chickens." *Immunopharmacology and Immunotoxicology* 18.3 (1996): 465-476.
7. Mirzaie, S., et al. "Effects of dietary Spirulina on antioxidant status, lipid profile, immune response and performance characteristics of broiler chickens reared under high ambient temperature." *Asian-Australasian journal of animal sciences* (2017).
8. Shanmugapriya, B., et al. "Dietary administration of Spirulina platensis as probiotics on growth performance and histopathology in broiler chicks." *Int. J. Rec. Sci. Res* 6.2 (2015): 2650-3.
9. Sugiharto, S., et al. "Effect of feeding duration of Spirulina platensis on growth performance, haematological parameters, intestinal microbial population and carcass traits of broiler chicks." *South African Journal of Animal Science* 48.1 (2018).
10. Jamil, ABM Rawshon, et al. "Prebiotic competence of spirulina on the production performance of broiler chickens." *Journal of Advanced Veterinary and Animal Research* 2.3 (2015): 304-309.
11. Kharde, S. D., et al. "Effect of Spirulina supplementation on growth performance of broilers." *Indian Journal of Veterinary Research* 21.1 (2012): 66-69.
12. Furuse, M., et al. "Effect of dietary sorbitol on the performance of broilers." (1991): 875-880.
13. Takahashi, Kazuaki, et al. "Effect of dietary sorbitol on growth performance and plasma acute phase protein concentration in male broiler chickens during immunological stimulation." *The Journal of Poultry Science* 39.2 (2002): 84-90.

