

# Impact of including defatted *Chlorella*, *Chloromonas* and *Nannochloropsis* biomass in broiler diets on intestinal morphology and histology

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Algae are an attractive nutrient source for broiler chickens. To reduce costs, one can use defatted algal biomass for feed and extract lipids for other, high-value applications like nutraceuticals. Yet, the effect of defatted algae on broiler gut health needs further investigation, which is the focus of our *in vitro* and *in vivo* studies.

Firstly, defatted algae were digested *in vitro*, the soluble digestate was analyzed and the growth potential of *Lactobacillus amylovorus* on the soluble digestate was evaluated. Next, an *in vivo* trial was executed with 105 broilers randomly distributed over 7 treatments: *Chlorella* 1 and 2%, *Chloromonas* 1 and 2%, and *Nannochloropsis* 1 and 2% and a control standard broiler feed. Performance parameters and intestinal health parameters were evaluated.

After *in vitro* digestion, the highest level of indigestible and soluble carbohydrates was observed for defatted *Nannochloropsis*. *In vitro* growth trial data suggested that *L. amylovorus* is able to use the digested *Chloromonas* and *Chlorella* fractions as growth substrates. The *in vivo* trials showed that ileum length tended to increase in broilers fed with algae, with the highest increase for *Nannochloropsis* 2% and *Chloromonas* 1% compared to the control group. Jejunum length increased slightly for all treatment groups compared to the control group. Villi width tended to increase for all algae-supplemented broilers, except for *Nannochloropsis* 2%. Villi length tended to increase with *Chloromonas* diets. Crypt depth seemed to increase especially for *Chlorella* 2% and *Nannochloropsis* 2%. Crypt width increased for all treatment groups compared to the control group, only *Chlorella* 1% did not differ from the control group. The thickness of the *Tunica muscularis* tended to decrease for all algae-supplemented broilers. In summary, including defatted algae biomass in broiler diets had clear and varying effects on gut morphology and histology, depending on the type of algae used.

This research was co-funded by NORTH-WEST EUROPE INTERREG, grant number NWE 639 as part of the IDEA project (Implementation and development of economically viable algae-based value chains in North-West Europe) & by Interreg 2Seas project, grant number 2S05-17 as part of the ValgOrize project (Valorisation of algae for a better taste).

