



BLACK SOLDIER FLY LARVAE (*HERMETIA ILLUCENS*) MEAL IN LOW INCLUSION RATES IS A SUITABLE PROTEIN SOURCE FOR BROILER CHICKENS

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BACKGROUND

The demand for poultry meat is increasing due to its popularity and desirable nutritional value. This leads to an increase in demand for protein-rich feedstuffs used in poultry diets. However, there is a growing concern about whether the planet's limited resources, such as agricultural land and freshwater, can meet the growing food demand (FAO and WHO, 2019). This results in increased research in alternative and sustainable feeds for poultry.

BLACK SOLDIER FLY LARVAE (BSFL):

The use of insects, as an alternative protein source is becoming an increasing focus of research. The most promising insect species for industrial production and the nutrient composition of the larvae is the black soldier fly (see Table). The larvae can grow sustainably on organic side streams of the food industry and therefore do not compete with humans for resources. Insects are a natural component of poultry diets in the wild. Since Regulation (EU) 2017/893, seven insect species have been approved as livestock in the EU, including the black soldier fly.

MATERIAL & METHODS

The feeding trial took place for 35 days on the research unit of the University of Applied Sciences in Bingen, Germany. A total of 90 one-day-old male broiler chickens (Ross 308) were allocated equally (6 pens/treatment) to one of three treatments: zero, approx. one quarter, and half of SBM replaced by BSFL diets (0%, 7.5%, and 15% in total diet; BSFL0, BSFL7.5, BSFL15). The diets were balanced to be isocaloric and isonitrogenous. Birds were fed diets in two phases (starter d1-21, 5 birds/pen; finisher d21-35, 3 birds/pen; *ad libitum*) and raised in standard commercial management conditions. Body weight (BW) and feed intake (FI) were recorded weekly to calculate average daily feed intake (ADFI), average daily gain (ADG), and feed conversion ratio (FCR).

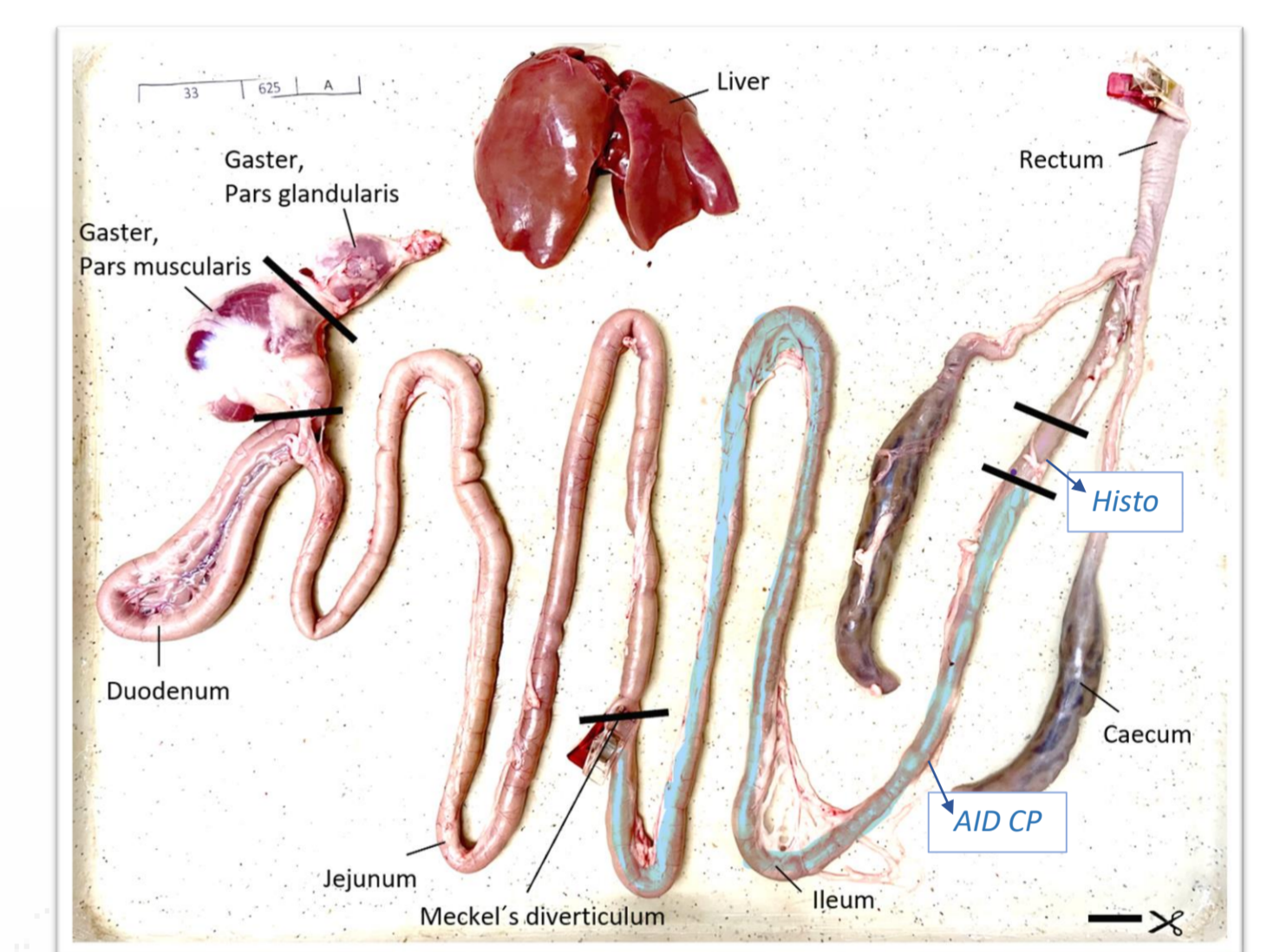
For apparent ileal digestibility (AID) of crude protein (CP) determination, digesta was collected at the end of each phase (day 21 and day 35, *postmortem*, n=3) from the ileum section between Meckel's diverticulum and approximately 3 cm before the ileo-ceco-colic junction. At the end of the experiment, the proventriculus, gizzard, and liver were collected to determine relative organ weight to live body weight at day 35 (n=12). Tissue samples (approx. 1 cm) of the ileum (2 cm before ileo-ceco-colic junction) were analyzed to determine histomorphologic indices (n=12).



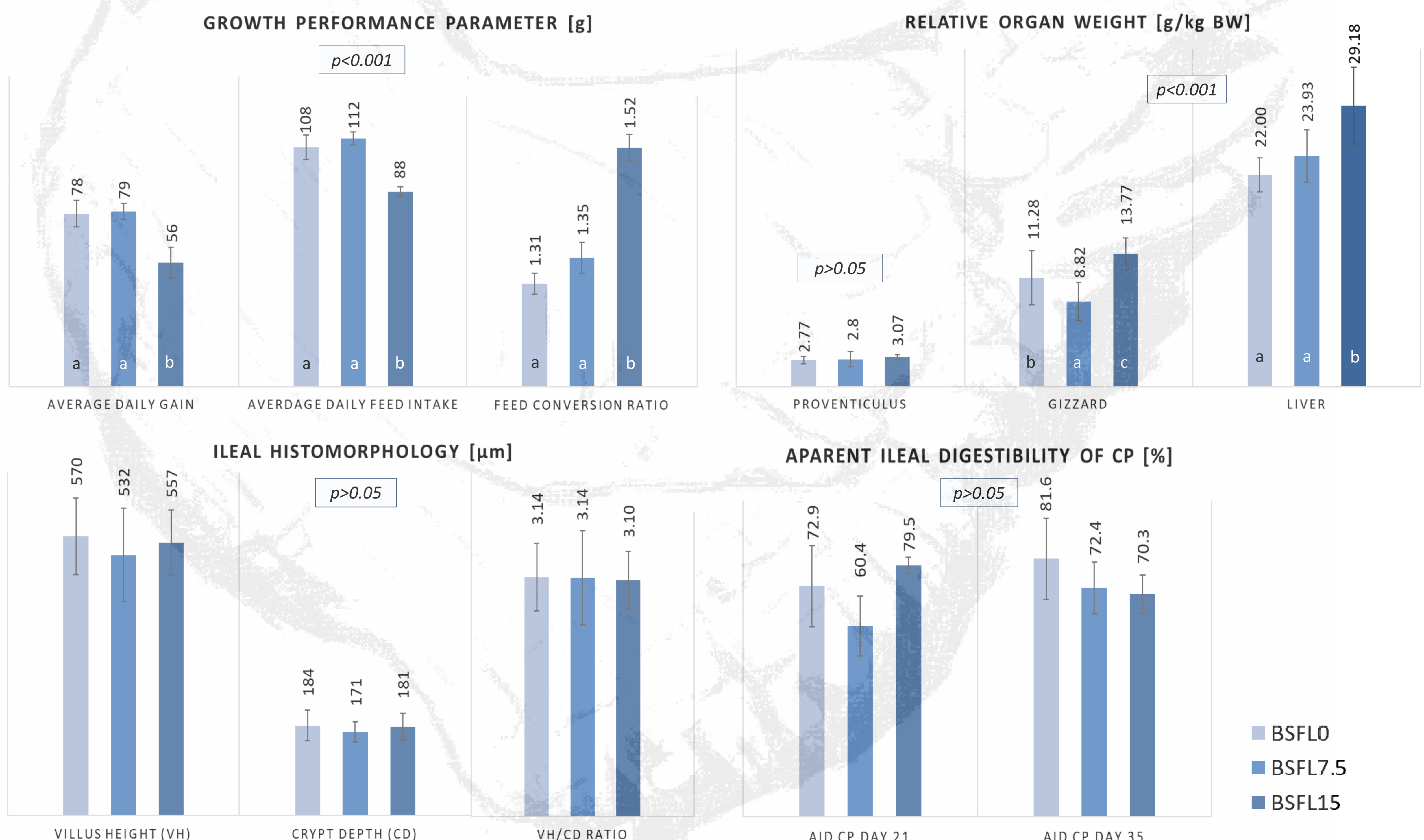
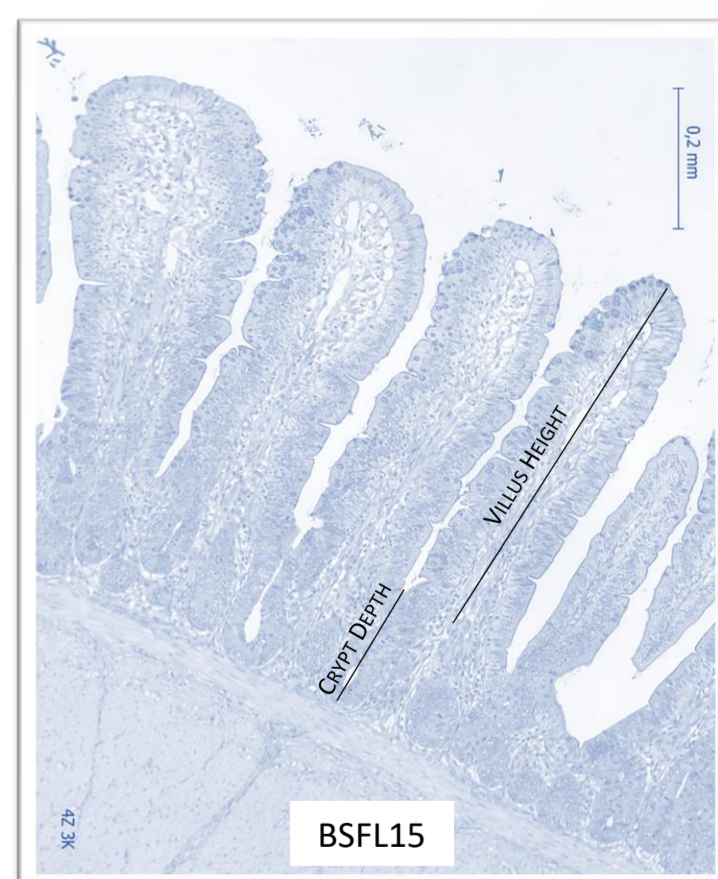
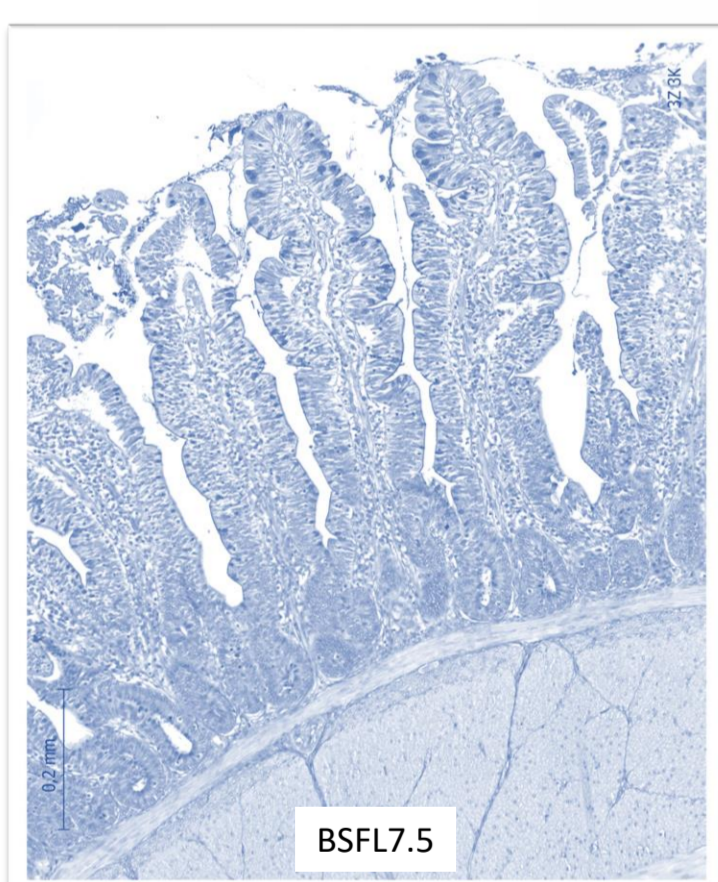
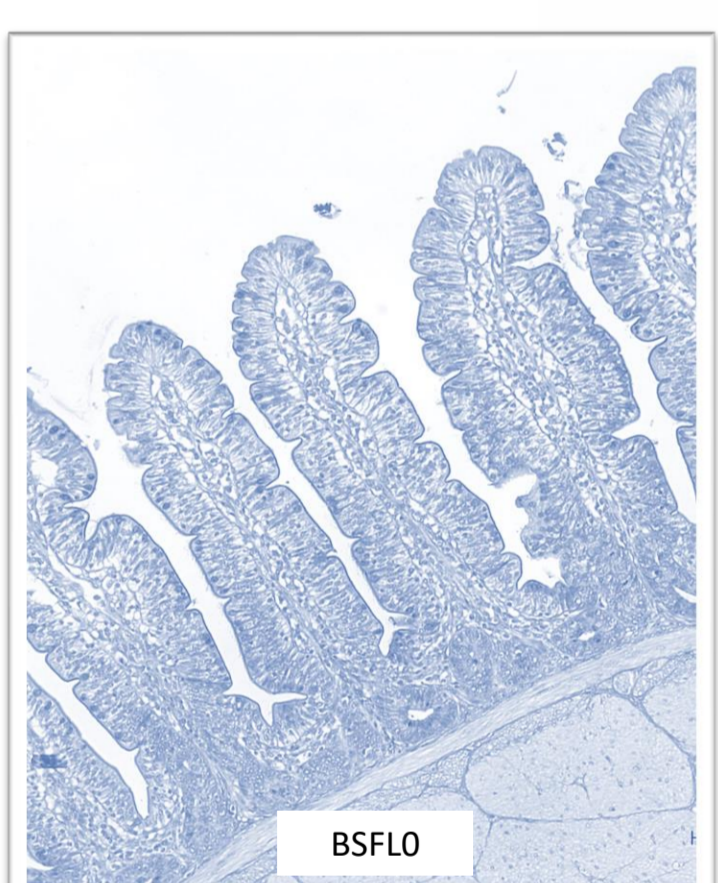
Nutrients (% FS)	BSFL meal	Soybean meal
Dry matter	96.00	88.40
Crude Protein	56.30	43.70
Crude ash	7.20	6.20
Crude fiber	9.50	4.50
Crude fat	12.90	2.20
Calcium	0.71	0.31
Phosphor	1.09	0.60
Lysine	2.85	2.63
Methionine	0.70	0.58
Cysteine	0.36	0.64
Threonine	1.96	1.68
Tryptophane	0.69	0.57

OBJECTIVE

In order to make broiler diets more sustainable by reducing soy and using regionally produced protein sources, the objective of the study was to determine the optimum use level of partially defatted BSFL meal in growing broiler diets and its effects on performance and digestibility parameters



RESULTS



CONCLUSION

The results of this study indicate that BSFL meal may be suitable as an alternative protein source in broiler chicken diets at low levels (7.5% in this case). At 7.5% BSFL meal in the broiler diet, the growth performance showed comparable performance with those in the control group. Moreover, there were no negative effects of BSFL inclusion on organ weight and ileal histomorphology. The use of 15% BSFL was unfavorable during the whole growing period. Decreased growth performance and feed efficiency compared to the control group and negative effects on organ development were observed in BSFL15 diets-fed birds. Moderate changes in nutrient digestibility and intestinal morphology were observed in BSFL15. Thus, it is probably that the low growth performance of animals fed 15% BSFL meal was due to the low ADFI. With reference to these and previous study (Stöhr et al., 2022) the use of 7.5 – 10% BSFL meal might be appropriate for broiler chickens.

REFERENCES

FAO and WHO (2019): Hazards associated with animal feed. Report of the Joint FAO/WHO Expert Meeting 12–15 May 2015, FAO headquarters, Rome, Italy. FAO Anim. Prod. and Health Report, No. 13, pp. 286
 Stöhr, N., Harig, P., Ibrahim, R., Schuh-von-Graevenitz, K. und Dusel, G. (2022): Larvenmehl der Schwarzen Soldatenfliege als teilweiser und vollständiger Ersatz für Sojaextraktionsschrot in der Broilerfütterung. VDLUFA-Schriftenreihe, Band 78/2022, VDLUFA-Verlag, Darmstadt, S. 520-527. ISBN: 978-3-941273-34-4