Probiotics positively impact high performing broilers

Poultry professionals are always seeking evidence-based ways to improve performance and reduce production costs of broiler flocks.

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Recently, a team of researchers from Frei Universitat Berlin under the supervision of Dr Jurgen Zentec conducted a trial to evaluate the impacts of Bacillus subtilis (BAS) inclusion in broiler diets with high standard nutrient content and nutrient deficiency (ND) on growth performance (GP) and nutrient digestibility.

Insufficient intake of nutrients is one of the most common stressors in poultry production and can lead to disturbance in the gut microecology, gut immunity, and barrier integrity, followed by dysbiosis and poor performance levels.

The objective of this trial was to test whether feed supplementation with GalliPro (B. subtilis DSM17299) to broilers under nutritional stress induced by lowering the energy and protein content of the diets, might be able to relieve the shortage of nutrients by improving their digestion and availability.

This study was conducted under a high level of production, feed quality and hygiene.

Material and methods

Six treatments were used in this experiment from day 1 to day 42. Diets were wheat-corn-soybean-based, with other ingredients added (wheat bran and soybean oil).

Some 120 chicks with 15 birds per pen were included in each treatment with eight replicates per treatment. This allowed a confidence interval of 95% with a power of 80% for a difference of 100g with an estimated standard deviation of 70g.

The standard diet was formulated to meet or exceed recommendations of the Society of Nutritional Physiology, while the other treatments were formulated to lower the energy and Crude Protein content and balance the amino acids (Table 1).

Each diet was formulated with or without GalliPro at the dose of 1.6 10^9 CFU in the starter, and 0.8 10^9 CFU per kg of diet for grower and finisher.

Two energy- and protein-/AA-reduced diets were formulated to have 0.20 and 0.40MJ/kg less ME, 3 and 6g/kg less crude protein (CP) compared with the standard diet.

Two exogenous enzymes (xylanase and phytase) and the anticoccidial drug narasin 60ppm were added to all six treatments.

Treatment 1 and 2 are with 100% of the formulation. Treatments 3 and 4 were formulated with a decrease of 0.2 MJ and 0.3 points of crude protein (98.4% of control feed of T1 and T2). Treatment 5 and 6 were formulated with a new decrease of 0.4 MJ and 0.6 points of crude protein (96.4% of the control feed of T1 and T2).

Table 1. Estimated proximate composition of starter and grower diets per treatment.

Starter (1-21 days)	T1	T2	T3	T4	T5	T6
Nutrient conc. (%)	100	100	98.4	98.4	96.8	96.8
GalliPro included	No	Yes	No	Yes	No	Yes
ME MJ/kg	12.03	12.03	11.82	11.82	11.61	11.61
CP (%)	20.86	20.86	20.56	20.56	20.27	20.27
Lys (%)	1.31	1.31	1.28	1.28	1.26	1.26
Grower (21-42 days)						
ME MJ/kg	12.53	12.53	12.32	12.32	12.11	12.11
CP (%)	18.43	18.43	18.14	18.14	17.85	17.85
Lys (%)	1.11	1.11	1.09	1.09	1.07	1.07

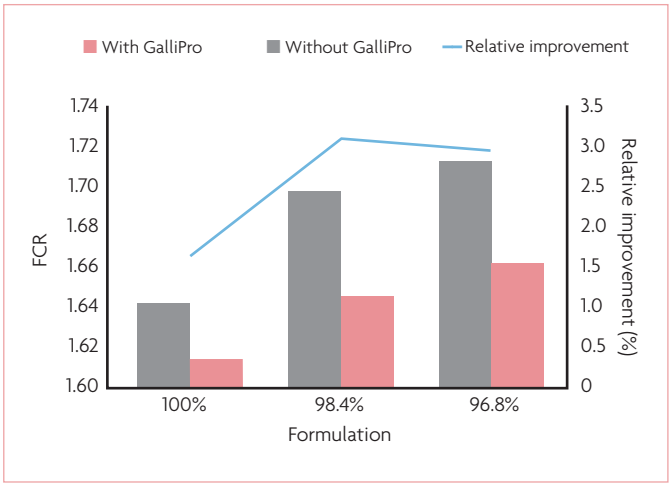

Fig. 1. FCR by treatment groups (1-42 days).

Results

The results are summarised in Figs. 1-3 both for FCR and body weight gain which were the two key indicators. Mortality was extremely low and thus not valuable input for this study. It can be seen from the FCR perspective an overall improvement of 2% (100% formulation) to 3% (98.4% and 96.8% formulations).

It is noticeable that the improvement is higher during the last three weeks (2-3.5%) compared to the first three weeks of age (1-2%).

Overall, FCR improvements were observed for the GalliPro supplemented diets at all nutrient concentrations and treatment period (starter and grower) (Figs. 1 and 2).

Regarding the weight, it is noticeable also that the improvement occurred in all diets regardless of their nutrient concentration. The effect was even higher when the concentration decreased to reach a 2.25% improvement in weight gain at 42 days (Fig. 3).

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Table 2. Feed savings by using GalliPro in the different nutritional strategies.

Trials	T2 vs T1	T4 vs T3	T6 vs T5
Feed concentration (%)	**100**	**98.4**	**96.8**
Feed saving per 3kg bird (€)	0.028	0.050	0.048
Feed saving per ton of feed (€)	5.46	9.82	9.48
Feed saving per ton of broiler (€)	32.19	65.24	66.20

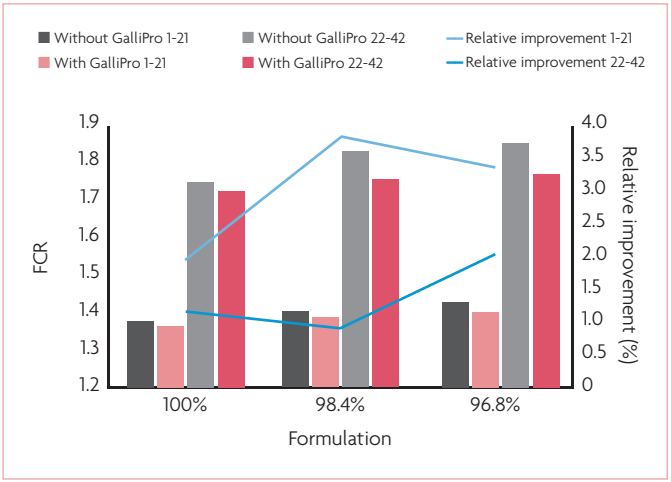

Fig. 2. FCR by treatment by period.

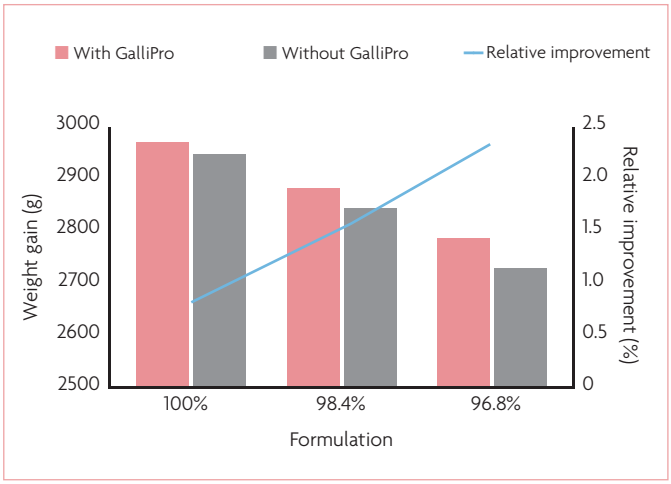

Fig. 3. Weight gain by treatment group (0-42 days).

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Discussion

In the conditions of this trial, feed supplementation with GalliPro resulted in performance improvements at three different nutrient concentrations.

The interest here is to find that the impact is very consistent during the life of the chicken and this even with a very high level of performance in the control group (1.616 of FCR and 3.028g at 42 days, while the genetic potential is 1.67 FCR and 3.023g).

These findings contradict the belief that probiotics may be not as efficient in highly performing birds. Indeed, the effect is important even in these conditions.

These findings agree with what was observed in the past by Blanch et al with a 2.3% improvement average in broilers. Here the improvement was 2-3% in FCR.

If we look to the model in place, it is interesting to find out what is the main economic value of these different strategies.

The reduction in energy and protein content of the diets in the present study was effective enough to negatively affect growth performance and can be considered as nutritional stress.

Adding GalliPro to the experimental (standard and deficient) diets led to better BWG and FCR in broilers ($P \leq 0.05$), It seems to be due to its positive impact on apparent ileal digestibility of crude protein, starch, and GE ($P \leq 0.05$).

Thus, it can be speculated that broilers received nutrient-deficient diets, as an adaptive response decreased FI and increased feed retention time, which as a result led to better digestibility of crude protein and gross energy.

For producers with 1,000,000 birds/year, the cost savings are between €28,000-50,000/year.

At the same time, if the metric is the cost of feed, we can calculate that the feed cost saving is between €5.46 -9.82/ton of feed, while producing the same quantity of chickens.

Based on this research, the poultry industry could decrease live bird costs from €32-66 per ton.

We can therefore confirm the economic value of GalliPro based on this research to be interesting for commercial use.

It looks like the economic value is interesting in all cases, in diets formulated at 100% of recommended ME and CP values, as well as in diets with lower levels of nutrients.

The higher savings in nutrient deficient diets can be due to a higher quantity of undigestible substrate in the lumen of the gut. However, from all the hypothesis, the treatment T2 was the most profitable of all (assumption of no influence of mortality).

However, based on this experiment, it is preferable for a fully integrated 3kg broiler producer to include GalliPro on top of the feed formulation to match the best economic value (Table 3).

This should be considered depending on the local economy or market demand in broiler weight and performance objectives.

Table 3. Feed savings by using GalliPro in the different nutritional strategies.

	T1	T2	T3	T4	T5	T6
Margin over feed (MoF)/3kg broiler (€)	1.43	1.46	1.32	1.39	1.31	1.38

Conclusion

In conclusion, supplementation of broiler diets with GalliPro (B. subtilis DSM 17299) probiotic feed additive can positively affect growth performance and nutrient digestibility and this positive impact may even be more pronounced in nutrient-deficient diets. ■

References are available from the author on request

Economical assumptions are:
Live weight market price of €1/kg
Control feed costs:
T1 and T2: €0.32/kg
T3 and T4: 0.315
T5 and T6: 0.31
No impact of mortality
MoF: margin over feed