

## **Supplementing drinking water with NSP-enzyme: an alternative solution to post-pelleting application.**

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### **Abstract**

The effect of supplementing NSP-enzyme through drinking water in broiler chickens was studied using AMEn tests with broilers fed wheat based diets and growth performance test of broilers fed corn-based diets. In addition, the solubility and mixability of the NSP-enzyme with other soluble products potentially used in drinking water were studied during 24 hour tests.

The administration of enzyme product in drinking water increased the AMEn of wheat-soybean meal based diet and improved the growth performance of broilers chickens fed a corn-soybean meal-based diet. No problem of mixability of enzyme product was observed with the 5 water soluble products tested. It can thus be concluded that Rovabio™ Excel can be used for broilers in the drinking water with the same efficacy as through the feed application.

### **Introduction**

The beneficial effect of NSP-enzyme added to the feeds of broilers, layers, turkeys is not clearly demonstrated. These NSP enzymes are frequently added in powder form to poultry feeds when they do not undergo aggressive heat treatments (mash or low pelleting conditions). This is not possible when processing temperature exceeds 85°C (185°F). For this application, liquid NSP enzymes have been developed. Liquid NSP enzymes are usually applied onto feed pellets after sieving. It has been demonstrated that they can be applied post-pelleting either before or after fat (Perez-Vendrell et al., 1999). However, such an application requires a specific and often costly post-pelleting spraying system. In some occasions, installing a post-pelleting spraying system is difficult and an alternative solution has been proposed: supplementing enzymes through the drinking water. Various studies (mixability with other products, apparent metabolizable energy improvement and growth performance improvement) were performed to determine the efficacy of this solution in broiler chickens.

### **Materials and Methods**

The enzymatic preparation used (Rovabio™ Excel LC) is produced from fermentation of non-GMO fungus *Penicillium funiculosum*. Rovabio™ Excel LC contains at least 17 compatible enzyme activities working in synergy on a very broad range of feedstuffs and species (Maisonnier-Grenier et al., 2004a).

In spring 2005, an experiment was conducted by Adisseo Thailand to determine the solubility and the mixability of Rovabio™ Excel LC with several water soluble products frequently used in drinking water in poultry farms. Twelve solutions were realized with Rovabio™ Excel LC at 0.2 l/m<sup>3</sup> and 2 l/m<sup>3</sup> in hard water (335.6 ppm CaCO<sub>3</sub>) with or without 5 water soluble products: (1) water soluble vitamins at 1.5 l/m<sup>3</sup> (2) coccidiostats at 1 l/m<sup>3</sup>, (3) anti-infective agent: Enrofloxacin at 0.5l/m<sup>3</sup>, (4) anti-infective agent: Erythromycin and Chlortetracycline HCL, (5) chlorine at 5-10 g/m<sup>3</sup>. The solubility and mixability was determined by visual observation of crystallization or precipitation of Rovabio™ Excel LC after 24 hours.

Two AME trials were performed in male broiler chickens to validate the efficacy of Rovabio™ Excel LC in drinking water in wheat fed broiler chickens. The energy balance was

performed on Ross male chickens between 19 and 22 days of age using the European Reference Method with *ad libitum* feeding and total excreta collection (Bourdillon *et al.*, 1990). All diets were based on wheat (58.2%) and soybean meal (26%). A multi-enzyme product, Rovabio Excel LC Excel, was included in water or directly in the diet after pelling.

Two different growth performance trials were performed in farm to confirm the efficacy of Rovabio™ Excel LC in drinking water. Broiler chicks of a commercial strain (Cobb) were fed soybean meal and corn-based diet for 6 or 7 weeks in two different countries (Italy and Thailand). The experimental diets were a typical starter (0-2 weeks), grower (3-5 weeks) and finisher (> 5 weeks) corn-soybean meal based diet adjusted for protein and energy levels. For the Italian trial, 48,000 birds are used and divided in two groups, one with standard feeding program and one with Rovabio™ Excel added through the drinking water at 133 ml/t. For the Thailand trial, 600 birds are used and divided in two groups, one with control diet and one with Rovabio™ Excel in drinking water at 110 ml/t.

Statistical analysis was performed using StatView 5.0 software program (Abacus Concepts INC. Berkeley, California). One way ANOVA was used to assess the effects of enzyme on AMEn and growth performance of broilers.

### Results and Discussion

Rovabio™ Excel LC is soluble in hard water and no precipitation nor crystallization was observed up to 24 hours. Similarly, there was no problem of mixability of the enzyme with the 5 water soluble products used.

Results in Figure 1 demonstrate a significant AME improvement following the addition of Rovabio™ LC through feed. This improvement was even better when Rovabio™ LC was added *via* drinking water at 100 ml/m<sup>3</sup>, but no effect was observed at the lower level (70 ml/m<sup>3</sup>). This test was repeated by another study with a simple experimental design - only one dose *via* drinking water (125 ml/m<sup>3</sup>). This second experiment confirm the significant uplift of Rovabio™ LC on dietary AME value (+115 kcal/kg, Figure 2) – above usual results for this type of diet (Maisonnier-Grenier *et al.*, 2004b).

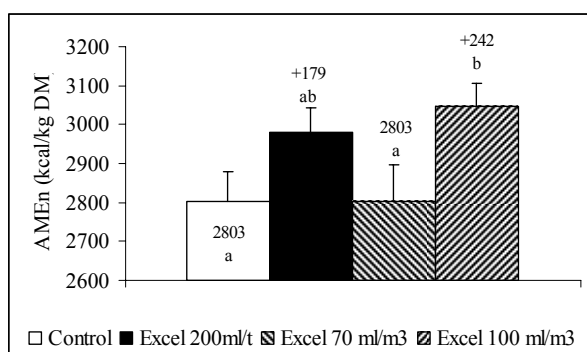


Figure 1. Effect of Rovabio™ Excel LC on AME of wheat-soybean meal based diet in broiler chickens.

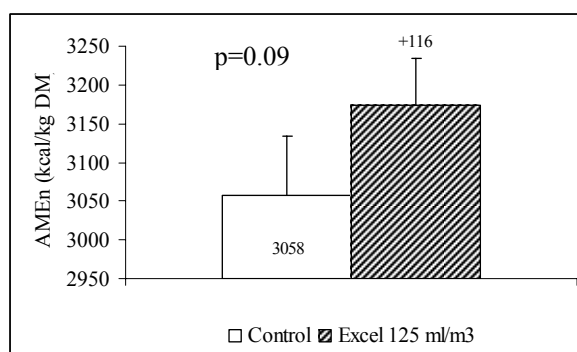


Figure 2. Effect of Rovabio™ Excel LC on AME of wheat-soybean meal based diet in broiler chickens.

The AME improvement was confirmed through growth performance trials. The addition of Rovabio™ Excel LC in drinking water improved growth performances of broilers. The average feed conversion was lowered by 3 % and the Performance Index was increased by 6 to 8 % (Table 1). These effects of Rovabio™ Excel LC in drinking water were similar to those observed with in-feed incorporation (Maisonnier *et al.*, 2004a).

Table 1. Growth performance of broilers fed corn-soybean meal-based diets; the drinking water either complemented with or without Rovabio™ Excel.

	Italy		Thailand	
	Control	+Excel	Control	+Excel
Weight gain	2.280	2.484	2.799	2.912b
Feed intake (g)	3,808	4,024	5,537	5,598
Feed conversion	1.67	1.62	2.02	1.96
Performance index	325	346	268	289

### Conclusion

It can thus be concluded that the application of NSP-enzymes through the drinking water is an efficient way to supply enzyme and an interesting alternative to post-pelleting application system in broiler feeds.

### References

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