

## **The nutritional efficacy of Hostazym X in relation to its dosage and difference in nutrient density with reference to 3 other NSP-enzymes in wheat-based broiler diets**

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### **Abstract**

The nutritional improvement with exogenous enzymes depends mainly on the target substrate and the enzyme specificity and/or activity profile. The objective of this study was to determine the nutritional value of Hostazym X in wheat-based broiler diets in relation to its dosage and differences in nutrient density, with reference to other NSP-enzymes.

The present results clearly show that the beneficial effect of NSP-enzymes depends on age and kind of enzyme preparation. There were significant differences between the respective NSP-enzymes. There was no additional effect of the higher Hostazym dosage on zootechnical response. Hostazym X at the higher dosage could compensate for the theoretical diet dilution.

### **Introduction**

Non-starch polysaccharides (NSP) show antinutritional properties by encapsulating nutrients and/or depressing the digestibility of nutrients through gastro-intestinal modifications. The nutritional improvement with exogenous enzymes depends mainly on (1) the target substrate (its dietary concentration and its NSP-content and- composition & structural arrangement of the polymers) and (2) the enzyme preparation (with its major and minor activities) (Huyghebaert, 1995). Enzyme manufacturers have developed several enzyme preparations with differences in specificity and/or activity profile.

The objective of this study was to determine the efficacy of several commercial NSP-enzyme preparation on the zootechnical performance in broilers under identical practical floor pen conditions.

### **Materials and Methods**

This experiment was designed as a Complete Block Design (7 treatments \* 2 gender \* 4 replicates = 56 pens with 36 females or 32 males for each pen).

For each fortnight growth phase "1-14-28-42 days" there were 2 diets : a control diet (ME<sub>n</sub> : 12.0, 12.3 & 12.5 MJ/kg, resp.) and a test diet with a 3% reduction in ME<sub>n</sub> and essential amino acids. Hostazym X was added at 175 and 250 mg/kg to the control diet and at 250 mg/kg to the test diet. The 3 other NSP-enzymes were added at their recommended dosage to the control diet only. All diets were supplemented with flavomycine (at 5 mg/kg during 1-42 d) and salinomycine (at 60 mg/kg during 1-28d). Broiler (Ross 308) response was measured in terms of daily weight gain, daily feed intake and feed conversion for all phases and for the entire period. Furthermore, the production value (for the entire period) as a more economic parameter was calculated from the following equation : (daily weight gain\*(1-(mortality+culling, %)/100)\*10/feed conversion). All parameters were subjected to a 3-factorial analysis of variance and the corresponding LSD-multiple range test.

### **Results and Discussion**

For the respective ages, all responses were significantly affected by both dietary treatments and gender but not by block. Compared with the females, the significantly higher weight gain (+15%) of the males was due to both a significantly higher daily feed intake (+11%) and a significantly better feed conversion (-3%)(1-42d). Only the results (as averages for males & females) of the LSD-multiple range test for the 7 treatments are given in tables 1 and 2.

In general, body weight of the broilers was significantly higher after enzyme supplementation

than that of the negative control. Moreover there were also significant differences between the resp. enzymes with the higher values for enzyme B and Hostazym X. Thereby the responses were similar at 14, 28 & 42 d with relative changes in significance. There was no additional effect of the higher Hostazym dosage on body weight. Hostazym X-250 (treatment 7 vs negative control treatment 1) can “over”-compensate for the theoretical diet dilution of 3%. For the starter period (1-14d), the very significantly higher growth rate on the supplemented diets was caused by both a (significantly or not) higher daily feed intake and a significantly better feed conversion when compared with the negative control diet. During the subsequent period (15-28 d), the very significantly higher growth rate on the supplemented diets (except for treatment 4) was mainly caused by a highly significantly higher feed intake and to a less extent to a better (or not) feed conversion when compared with the negative control. During the final period (29-42 d), the significantly (or not) higher growth rate on the supplemented diets was due to both a higher (or not) feed intake and a better (or not) feed conversion when compared with the negative control. For the entire growing period (1-42 d), the significantly higher growth rate on the supplemented diets was mainly caused by a significantly higher (or not for treatment 4) feed intake than to a significantly better feed conversion when compared with the unsupplemented control. “Feed intake” as a contributing factor to body weight became more important with advancing age of the flock. The average percentage “mortality and culling” was very low (2.0%) and uniformly spread over all treatments. The production value was significantly higher for enzymes A, B and Hostazym X than for enzyme C. Because on the diverging impact of the factor feed intake (85.2, 92.1 & 86.8 g for treatments 1, 6 & 7) the nutritional evaluation of Hostazym X “250” depended on the response parameter “body weight vs feed conversion”. In treatment 6 the higher body weight of 10.5% was more related to feed intake (+8.1%) than to feed conversion (2.3%). However, in treatment 7 the higher body weight of 3.4% was more related to feed conversion (1.8%) than to feed intake (+1.9%). Hostazym X “250” could compensate for the 3%-difference in nutrient density (treatment 7 vs control). The return-on-investment will depend on the market prices for : the live broilers, the respective diets (a 3% difference in nutrient density corresponds with about 8 euro/ton) and Hostazym X.

**Table 1 :** The effect of enzyme supplementation on body weight of broiler chickens

Treatment	BW-14d G	BW-28d G	BW-42d G	Mortality & culling %	Production value
1 : control “C”	235 d	907 c	2080 e	2.5 a	273 c
2 : C+enzyme A	286 b	1042 b	2251 c	0.7 a	317 a
3 : C+enzyme B	306 a	1088 a	2298 b	2.6 a	323 a
4 : C+enzyme C	268 c	951 c	2143. d	2.6 a	298 b
5 : C+Hostazym (175)	319 a	1130 a	2341 a	1.1 a	325 a
6 : C+Hostazym (250)	307 a	1086 ab	2298 b	2.6 a	318 a
7 : Test+Hostazym (250)	254 c	933 c	2151 d	1.9 a	290 b
LSD (P:0.05)	17	45	39	2.4 a	11

Table 2 : The effect of NSP-enzyme supplementation on the zootechnical performance

Treatment	Daily weight gain, g	Daily feed intake, g	Feed conversion
	1-14 days		
1 : control "C"	14.0 d	24.4 d	1.741 e
2 : C+enzyme A	17.7 b	27.2 bc	1.536 bc
3 : C+enzyme B	19.1 a	27.9 b	1.459 a
4 : C+enzyme C	16.4 c	25.5 cd	1.555 c
5 : C+Hostazym (175)	20.1 a	31.4 a	1.566 c
6 : C+Hostazym (250)	19.2 a	28.7 b	1.498 ab
7 : Test+Hostazym (250)	15.4 c	25.8 cd	1.676 d
LSD (P:0.05)	1.2	2.0	0.036
Treatment	15-28 days		
1 : control "C"	48.1 c	79.7 c	1.659 b
2 : C+enzyme A	54.0 b	87.9 b	1.629 ab
3 : C+enzyme B	55.9 ab	89.5 b	1.602 a
4 : C+enzyme C	48.8 c	78.5 c	1.615 ab
5 : C+Hostazym (175)	57.9 a	93.7 a	1.619 ab
6 : C+Hostazym (250)	55.7 ab	90.6 ab	1.626 ab
7 : Test+Hostazym (250)	48.5 c	80.6 c	1.660 b
LSD (P:0.05)	2.6	3.5	0.047
Treatment	29-42 days		
1 : control "C"	83.8 b	151.6 cd	1.812 bc
2 : C+enzyme A	86.3 ab	153.5 bc	1.784 abc
3 : C+enzyme B	86.4 ab	155.8 ab	1.811 bc
4 : C+enzyme C	85.2 ab	149.5 d	1.760 a
5 : C+Hostazym (175)	86.5 a	156.9 a	1.820 c
6 : C+Hostazym (250)	86.6 a	157.1 a	1.820 c
7 : Test+Hostazym (250)	87.0 a	154.0 b	1.773 ab
LSD (P:0.05)	2.7	2.4	0.043
Treatment	1-42 days		
1 : control "C"	48.6 e	85.2 de	1.755 d
2 : C+enzyme A	52.7 c	89.5 c	1.700 ab
3 : C+enzyme B	53.8 b	91.1 bc	1.695 ab
4 : C+enzyme C	50.1 d	84.5 e	1.689 a
5 : C+Hostazym (175)	54.8 a	94.0 a	1.717 bc
6 : C+Hostazym (250)	53.8 b	92.1 b	1.714 bc
7 : Test+Hostazym (250)	50.3 d	86.8 d	1.725 c
LSD (P:0.05)	0.9	1.8	0.023

(1) ANOVA : significantly different at the given P-value (<0.05)

(2) LSD m.r. test : averages with the same letter are not significantly different from each other at P:0.05.

## References

HUYGHEBAERT, G. (1995) The bio-efficacy of carbo(NSP)-enzymes in poultry diets. In Proc. 2nd Eur. Symp. Feed Enz. (Noordwijkerhout, The Netherlands : 25-27 oct.): 52-57.