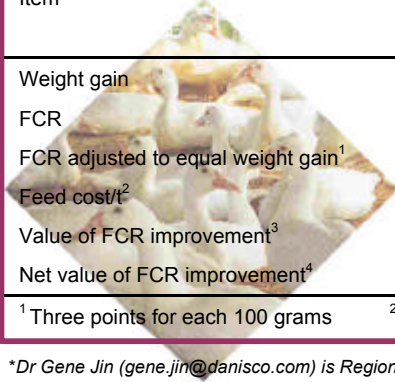


# Enzymes release extra energy in corn-based duck feeds



**L.Z. (Gene) JIN\* argues that enzyme supplementation in corn-based diets for ducks not only improves overall performance, but it can also increase body weight uniformity and provide excellent opportunities for reducing feed costs.**



**U**se of enzymes to improve the digestibility of corn-based diets in Asian duck production is not widespread and yet evidence points to significant potential improvements in bird performance and opportunities to cut feed costs if enzymes are applied.

The application of a suitable enzyme to duck diets will reduce the differences in the digestibility of starch and protein in corn, sorghum and soybean meal that contribute to the variability in bird performance. Even cornstarch digestibility is more variable than commonly thought, and rarely exceeds 85% at the terminal ileum.

Similarly for soybean meal, dry matter digestibility is variable and this variability is most commonly attributed to protein-based anti-nutritional factors (e.g. trypsin inhibitors, lectins, antigenic factors), oligosaccharides and other fibrous components.

A series of studies using an

amylase, protease and xylanase enzyme complex (Avizyme 1502, Danisco Animal Nutrition) has demonstrated the benefits of improving the digestibility of the feed through enzyme application.

One study conducted at Purdue University, USA (Hong et al, 2002) has shown an average 4-5 % improvement in duck performance from supplementing corn/soy diets with the enzyme complex.

The study used one-day old mixed sex Pekin ducklings and compared the performance of birds fed a corn/soy diet without enzyme supplementation (control) and the control plus enzyme added at 0.375 and 0.5kg/tonne (Figure 1).

After 42 days, the results showed that enzyme addition improved (P<0.05) feed conversion ratio (FCR) of the ducks by 11 points with the lower dose of enzyme and 20 points with the higher dose.

The study also revealed improvements in ileal nitrogen retention with enzyme addition, by

**Table 1: Economics of enzyme use in ducks (Purdue University trial).**

Item	Control	+Avizyme 1502 (0.5 kg/t)	Change
Weight gain	3052g	3293g	+241g
FCR	2.38	2.18	
FCR adjusted to equal weight gain <sup>1</sup>	2.38	2.11	11.3% improvement
Feed cost/t <sup>2</sup>	\$190	\$193	+ \$3/t
Value of FCR improvement <sup>3</sup>			\$21.5/t feed
Net value of FCR improvement <sup>4</sup>			\$18.5/t feed

<sup>1</sup> Three points for each 100 grams

<sup>2</sup> Average cost of duck feed in Malaysia

<sup>3</sup> 11.3% of \$190 = \$21.5

<sup>4</sup> \$21.5 minus \$3 = \$18.5

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6.6% (from 74% with the control diet to 78.9% with control plus Avizyme at 0.5kg/tonne). Ileal energy digestibility was also improved by 3.8 % (69.83 vs 72.46%) with enzyme addition.

Importantly for an industry that is facing increasing environmental pressure, this study further highlighted that feed enzymes can significantly reduce excreta nitrogen. Excreta nitrogen digestibility was increased by 28% in ducks fed the diets supplemented with enzyme at 0.5 kg/tonne (Figure 2).

The economic value of the performance improvements shown in the Purdue University trial have been calculated, using feed costs for Malaysia (Table 1). These show a net saving of US\$ 18.5/t feed, or around 10% of total feed costs.

The ability of enzymes to improve nutrient digestibility and bird performance offers feed producers the opportunity to reduce the levels of some dietary nutrients (e.g. energy) when formulating diets based on corn/sorghum by up to 4% as a commercial study conducted in Taiwan has demonstrated.

The study compared the performance of one-day old mixed sex Pekin x Muscovy x local breed ducklings assigned to three treatments.

The treatments were a standard corn-based diet (positive control); the control diet reduced in ME by 2% and 3% in the starter and grower diets respectively (negative control); and the reduced energy control diet with Avizyme 1502

**Table 2: Enzyme supplementation allows dietary energy to be reduced in corn-based duck diets (Commercial poultry producer, Taiwan).**

	Starter 0-21 days		Grower/Finisher 22-56 days	
	Control	Reduced ME	Control	Reduced ME
Corn	579	595.8	612.3	625.9
Soybean meal, 48%	167.4	225.6	10	82.5
Full fat soy	123.3	50.8	166	78
Wheat bran	-	-	50	50
Fish meal	30	30	-	-
Molasses	-	-	5	6
Corn gluten meal	44.4	41.9	-	-
Rapeseed meal	20	20	-	-
Animal fat	5	5	-	-
DL-methionine	0.3	0.3	0.9	0.9
L-lysine-HCl	-	-	1	1.3
Other	24.7	30.8	35.4	36
Avizyme 1502	-	-0.5	-	-0.5
ME, kcal/kg	3080	3018	2950	2862
Protein, %	22	22	16	16
Lysine, %	1.2	1.2	0.94	0.94
Methione, %	0.45	0.45	0.39	0.39
M + C, %	0.85	0.85	0.72	0.72

included at 0.5kg/tonne. The energy reduction was achieved by lowering the inclusion rate of full fat soy in the diet (Table 2).

At 56 days the FCR of ducks fed the enzyme was not only comparable to the positive control but had actually improved by 6 points (Figure 3). This suggests that the dietary energy reduction of 2-3 % employed in this study was quite conservative.

As a consequence of reducing the energy specification of the enzyme supplemented diet, bird performance was maintained, while relative feed cost was significantly lowered, even after taking account

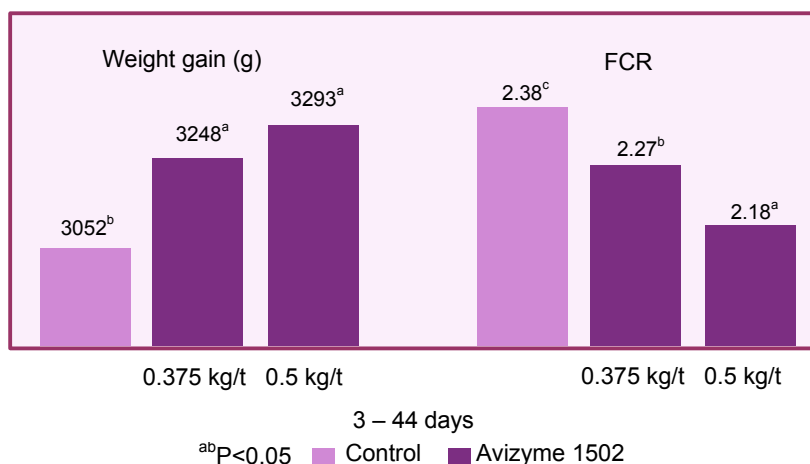
of the cost of enzyme.

As well as lifting overall performance, achieving uniformity of production is a key issue for producers. Variable bird performance can result in potential losses in revenue, either because a higher percentage of birds take a longer time to reach the specified target weight range, resulting in increased overhead costs; or because birds fall outside the target weight range preferred by the slaughterhouse, supermarket or consumer.

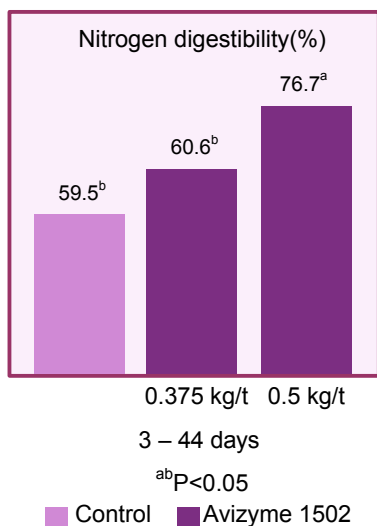
A trial at the Roslin Research Institute in the UK demonstrated how the application of an enzyme in corn-based diets can reduce variability in performance. This is because enzymes have a greater effect on poorer quality batches of corn compared to higher quality corn, and smooth out differences in feed value by releasing more energy from the lower energy corns. Consequently the overall performance of the birds fed enzyme-supplemented diets is improved and the range between the best and worst performing birds is narrowed.

In the trial, 288 one-day old mixed sex Pekin ducks were allocated to two treatments — the corn-based pellet control feed and the control with Avizyme 1500 added at 1kg/tonne (equivalent to Avizyme 1502 at 0.5 kg/t). As well as improving average FCR by 5

**Figure 1: Enzyme supplementation improves performance of ducks fed corn-based diets (Purdue University, USA).**

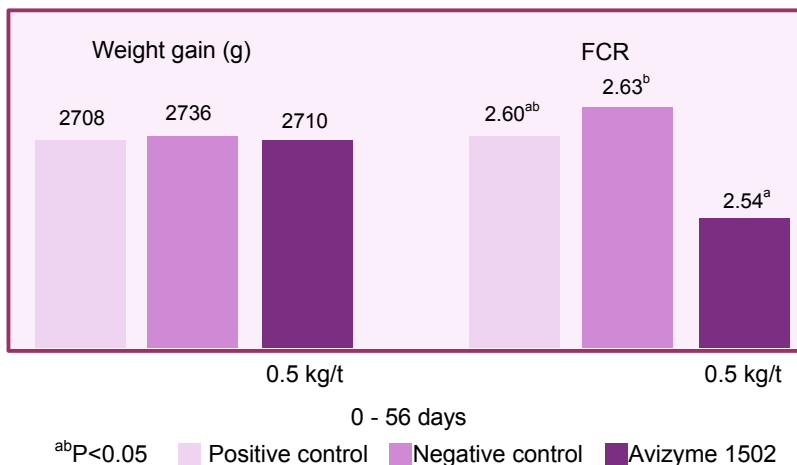


**Figure 2: Enzyme supplementation reduces nitrogen excretion (Purdue University, USA).**



points, the enzyme-supplemented feed also increased bodyweight uniformity. The percentage of birds falling within average bodyweight ( $\pm 15\%$ ), at 42 days of age increased from 91 %, in the control diet to 93% in the enzyme-supplemented diet.

**Figure 3: Enzyme supplementation allows dietary energy to be reduced (Commercial poultry producer, Taiwan).**



### Summary

Recent research clearly shows that duck producers can benefit from using an appropriate enzyme blend in corn-based feeds to achieve an improved and more consistent feeding value.

Enzyme supplementation of duck feeds not only improves overall performance, but it can also increase body weight uniformity and provide excellent opportunities for reducing feed costs.

*Reference: Hong, D, Burrows, H, and Adeola, O, 2002. Addition of Enzyme to Starter and Grower Diets for Ducks. Poultry Sci: 81: 1842-1849*

Keywords: Avizyme 1500, Avizyme 1502, Avizyme 1510, Corn, Duck, Digestibility, Nitrogen, Recommendation for use, Uniformity, Variability, Energy