

THE EFFECT OF ENZYME SUPPLEMENTATION TO CONTAINING CASSAVA DIETS ON ENERGY AND PROTEIN DIGESTIBILITIES AND GROWTH PERFORMANCE OF PIGS

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ABSTRACT

Two trials were conducted to evaluate the effects of enzyme supplementation on total diet digestibility and growth performance of pigs. Twenty castrated pigs with an average body weight of 23kg were allocated individually for 16-day digestibility trial of 5 treatments, 4 replicates. Five hundred twenty five pigs with an average initial body weight of 20-21 kg were allocated in a CRD trial of 7 treatments, 5 replicates. The treatments were : T1: non-cassava diet; T2: T1 + plus enzyme TOP-Dry; T3: T1 + enzyme V-Dry; T4: 30% cassava; T5: 30% cassava + TOP-Dry ; T6: 50% cassava and and T7: 50% cassava+ TOP-Dry. Maize had been replaced by different cassava levels in diets of the treatments. The trial results showed that supplementation of 0.05% V-Dry into control diet improved digestibility of DM, energy and protein by 7%, 5%, 6.8%, respectively; and 0.05% Top-Dry into diet with 30% of cassava improved digestibility of protein by 2.3%. Adding 0.05% enzyme into diets with 30% and 50% cassava improved DWG and FCR by 4.7%, 3.8% and 2.7%, 3%, respectively. Supplementation of 0.05% enzyme into non-cassava diet gave the best results in term of feed efficiency and feed cost.

Key words: Pigs, enzyme, cassava, digestibility, growth

1. INTRODUCTION

Enzyme supplementation into pig feeds has been practiced for some time. The main reasons for using enzyme supplements in pig diets are stimulating nutrient digestion and eliminating anti-nutrition agents in order to reducing feed cost. The anti-nutrition agents in pig diets are non starch polysaccharide (NSP) (β - glucans, arabinoxylans, cellulose) which reduce digestibility of nutrients since in the gut environment increases viscosity of digesta and holds water, which cover gut microvilli and hence, reduce digestibility and absorbability (Tan,1999; Partridge, 1997). Several studies showed that supplementation of enzyme (xylanase; cellulose; alpha-amylase; protease) in grain diets increased digestibility of energy, protein and amino acids, improved weight gain and reduced feed cost (Yin *et al.*, 2000; Barrera *et al.*, 2003). Currently, enzyme is used widely in the diet for pigs. However, using enzyme is just basing on experiences and feeling. With the view to assess the effect of enzyme supplementation in

different pig diets of the locally available feeds in Vietnam, the trials were conducted.

Objectives

Study the effect of enzyme supplementation in containing cassava diets on energy and protein digestibility, and on growth performance of pigs.

2. MATERIALS AND METHODS

2.1 Materials

- Growing pigs of three ways crossed breed (Duroc x Yorkshire x Landrace).
- kemzyme V Dry and TOP Dry are products of Kemin (Alpha Amilase, Protease, Xylana and Cellulase).
- Feed ingredients: corn, rice bran, cassava, soybean meal, vegetable oil, lysine, methionine, mineral and vitamin premix.

2.2 Methods

Digestibility trial: Twenty castrated pigs (Yorkshire x Landrace) with body weight around 23 kg were allocated into 5 groups individually of one pig per pen for a 4-replicate treatment over 16 days. Pigs were

allocated into metabolism cages and randomly assigned to each of 5 diets. All pigs were fed the same diet during 8 days as adaptation period. Feces collection was

taken place on the next 5 days. Two days after the termination of fecal collection, pigs were slaughtered and digesta at the end of ileum were collected.

Trial design

Treatment	T1 - 0% Cassava	T2 - 0% Cassava	T3 - 0% Cassava	T4 - 30% Cassava *	T5 - 30% Cassava *
V Dry	-	-	500 g	-	-
TOP Dry	-	500 g	-	-	500 g

T = Treatment; ()= Corn was replaced by % cassava chip*



Feces collection

Growth trial: Five hundred and twenty five pigs at 60 days of age were randomly assigned into 7 treatments. Pen served as the experimental unit providing 5 replications

during the grower phase and 5 replications during the finisher phase. 15 pigs were housed per pen. Body weight and feed intake were measured at 116 and 172 days of age.

Trial designs:

Treatment	T1 0% Cass	T2 0% Cass	T3 0% Cass	T4 30% Cass *	T5 30% Cass *	T6 50% Cass *	T7 50% Cass *
V Dry	-	-	500 g	-	-	-	-
TOP Dry	-	500 g	-	-	500 g	-	500 g

T = Treatment; Cass = Cassava; ()= Corn was replaced by % cassava*

3. RESULTS AND DISCUSSION

3.1 Determination of DE and digestibility coefficient of protein

Table 1 Digestible energy and digestibility coefficient of protein

Treatment	T 1	T 2	T 3	T 4	T 5	P
Total collection						
Value DE (kcal)	3429 ^b	3465 ^b	3587 ^a	3503 ^{ab}	3469 ^b	0.005
Protein (%)	76.50 ^b	78.50 ^{ab}	81.75 ^a	76.75 ^b	78.50 ^{ab}	0.018
Ileal digestibility						
Value DE (kcal)	3227	3334	3211	2964	3052	0.097
Protein (%)	71.57 ^{ab}	75.23 ^a	75.21 ^a	68.80 ^b	73.12 ^{ab}	0.006

Figures in the same row with different superscripts were significant difference ($P < 0.05$)



Ileum collection

Results in Table 1 showed that enzyme supplement both V Dry and TOP Dry in corn and soybean meal-based diets as well as cassava diets improved significantly digestibility of protein and DE. Ileal digestibility of energy was no significant difference among treatments, although treatments without cassava had higher ileal

energy digestibility than that with cassava ones. On the other hand, ileal protein digestibility of treatments without cassava and with enzyme supplementation (both Top and V Dry) was significant higher than that of treatment with cassava and without enzyme (T4).

3.2 Daily weight gain (DWG) and feed conversion ratio (FCR)

Table 2 Average weight gain (ADG) and feed conversion ratio (FCR)

	T 1	T2	T3	T 4	T 5	T6	T 7	P
ADG of grower (g/pig/day)	612 ^{bc}	626 ^b	641 ^a	577 ^d	616 ^{bc}	565 ^e	594 ^c	0.01
ADG of finisher (g/pig/day)	731 ^b	746 ^a	749 ^a	699 ^{cd}	721 ^b	684 ^d	704 ^c	0.01
Overall ADG (g/pig/day)	672 ^b	686 ^{ab}	695 ^a	638 ^d	668 ^{bc}	625 ^e	649 ^c	0.01
FCR of grower	2.55 ^b	2.51 ^{ab}	2.47 ^a	2.63 ^c	2.54 ^b	2.70 ^d	2.59 ^{bc}	0.01

FCR of finisher	3.07 ^b	3.04 ^{ab}	3.02 ^a	3.15 ^c	3.10 ^{bc}	3.21 ^d	3.15 ^c	0.01
Overall FCR	2.83 ^b	2.80 ^{ab}	2.77 ^a	2.92 ^{cd}	2.84 ^{bc}	2.98 ^d	2.89 ^c	0.01
Feed cost (VND/kg weight gained)	17128^{bc}	16992^{ab}	16800^a	17631^d	17247^c	17977^e	17543^d	0,01

Figures in the same row with different superscripts are significant difference ($P < 0.05$)

Results in Table 2 showed that replacing 30% and 50% corn in the diet by cassava chip declined ADG by 5% and 7%; increased FCR by 3.2% and 5.3% compared to the control ($P < 0.05$), respectively. Supplementation of 0.05% enzyme TOP Dry

improved ADG and feed efficiency by 4.7%, 3.8% and 2.7%, 3%, respectively. The diet with 30% cassava chip plus TOP Dry provided similar ADG and FCR compared with corn-based diets.

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4. CONCLUSIONS AND RECOMMENDATIONS

- Supplementing 0.05% V Dry in corn-based diet improved digestibility of energy and protein by 5%, 6.8%, respectively
- Adding 0.05% Top-Dry into 30% cassava diet improved digestibility of protein by 2.3%.
- Supplementation of 0.05% enzyme TOP Dry into 30% and 50% cassava diets improved DWG and FCR by 4.7%, 3.8% and 2.7%, 3%, respectively.
- Supplementation of 0.05% enzyme into corn-based diet obtained the best results in term of feed efficiency and feed cost.