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Growth Performance of Weanling Pigs as Affected by Different Levels of Active Dry Yeast Supplementation

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Abstract

Due to apprehensions concerning bacterial resistance to antibiotics in both humans and animals, non-antibiotic alternatives with the similar or better efficacy must be evaluated. Yeasts are promising alternatives to antibiotics, as they can improve growth performance and stimulate the immune system of animals. The objectives of this study were to determine i) the effects of active dry yeast on the growth performance of growing pigs and ii) the optimum level of yeast supplementation on growing pigs that gives the best feed intake : body weight gain ratio. Twelve(12) growing pigs were randomly distributed to 4 groups the Complete Randomized Design (CRD) with the following dietary treatments: T1- 0% active dry yeast, T2- 0.2% active dry yeast, T3- 0.3% active dry yeast, and T4- 0.4% active dry yeast. No significant differences were found in the final weight, body weight gain, average daily gain, and feed conversion ratio of the pigs. However, active dry yeast supplementation resulted in improved feed conversion efficiency of the pigs by 10 to 13%. A higher return above feed cost was achieved at 0.3% supplementation of active dry yeast in the ration. Further study is recommended to evaluate the potential of active dry yeast supplementation in the ration of other monogastric animals.

Keywords: active dry yeast, weanling pigs, growth performance

1. Introduction

Active dry yeast exist in the form of tiny, dehydrated granules. They are alive but dormant because of the lack of moisture. When mixed with a warm liquid, the cells once again become active (Herbst and Herbst, 2007). Active dry yeast is used to rise dough for baking bread, rolls, a few types of cake, and for any type of risen bread. Yeast is essentially tiny, living cells, and the specific yeast used in active dry yeast is *Saccharomyces cerivisiae*. Yeast supplementation in animal feed is difficult to assess, since the effects of yeast are by no means instantaneous. Nevertheless, several animal trials have shown that yeast is the most cost effective performance enhancing feed ingredient available as it improves feed conversion efficiency and fiber digestibility (Vázquez-Añón, 2000).

Antibiotics are commonly incorporated in the diets in farm animals at low levels to improve growth and feed efficiency, to decrease flock variability, to prevent disease and to improve digestion of carbohydrates and fats (Doyle, 2001). Their use has facilitated the efficient production of reasonably priced, high quality meat and has enhanced the wellbeing of farm animals by reducing incidence of disease. However, an increase in bacterial resistance to antibiotics in both human and animal populations has caused an increasing consumer concern for animal drug residues in meat. The European Union imposed a complete ban on the use of antibiotics in animal feed as growth promotants since January 1, 2006. These bans are now being considered in other countries including the Philippines, and therefore, non-antibiotic alternatives with similar effects on animal performance efficacy must be evaluated (Koeleman, 2014). Yeasts are promising alternatives to antibiotics, as they have been shown to improve growth performance and stimulate the immune system of young animals. (Korkmaz and Cakirogullari, 2011). It was also used in pre-wean and phase 1 nursery diets with no negative effects on growth performance of nursing and weanling pigs (LeMieux, *et al*., 2010). The objective of this study was to determine the efficacy of including active dry yeast in the diet on the growth performance of pigs.

It is anticipated that the findings from the present studies would facilitate local farmers to utilize yeast to contend against the high cost of feeds and feed additives in the market.

Specifically, this study aimed to determine:

1. the effects of active dry yeast on the initial weight, final weight, body weight gain, average daily gain, and feed conversion ratio of the pigs.

2. the optimum level of yeast supplementation on growing pigs that gives best result.

2. Methodology

2.1 Locale of the Study

The study was conducted at the Piggery project of MOSCAT, Claveria, Misamis Oriental from August 01 to November 10, 2011. The pens were thoroughly cleaned and properly disinfected two (2) weeks before the start of the study. Watering and feeding facilities were also prepared following the prescribed disinfection procedure. The study was conducted for 105 days.

2.2 Animals and animals welfare

Twelve (12) weanling pigs of about 6 weeks of age were used in the study. All animals were given a prophylactic treatments for endo- and ectoparasites before the beginning of data collection. Water was available *ad libitum.* Body weight and feed intake were recorded monthly. Water was provided readily through an automatic waterer installed in their respective pens. Rigorous control program was used by implementing a health program. Parasite control and vaccinations for the growing pigs was carried out under advice from a veterinarian.

2.3 Dietary Treatments

Twelve (12) growing pigs (Figure 1) were randomly distributed using Complete Randomized Design (CRD) into four groups with three replications having one pig per replication**.** Animals from each group were fed with the commercial feeds containing the inclusion of the following level of active dry yeast: T1- 0% active dry yeast, T2- 0.2% active dry yeast, T3- 0.3% active dry yeast, and T4- 0.4% active dry yeast. The animals were given their daily total feed requirements based on 3% of the total live weight (dry matter basis) twice a day: in the morning (0800hrs) and in the afternoon (1600hrs).

2.4 Experimental Animals

Twelve (12) weanling pigs (Figure 1) of about 6 weeks of age coming from the same litter were used in the study. All animals were given a prophylactic treatments for endo- and ectoparasites before the beginning of data collection. The pigs were randomly divided into four groups with three replications having one pig per replication. Water was available *ad libitum.* Body weight and feed intake were recorded monthly. Pigs were raised under

Figure 1. Experimental animals used in the study

confinement system at the Piggery project of MOSCAT. Water was readily available through an automatic waterer installed in their respective pens.

Rigorous control program was used by implementing a health program. An advice from a veterinarian about parasite control and vaccinations for the growing pigs was also considered.

2.5 Feed Intake and Growth

The daily feed intake of the experimental pigs was measured by dividing the total amount of feeds consumed over the number of days the animals were fed with the experimental diets. The liveweight of the animals were recorded at the beginning of the experiment and on monthly basis for the next three months. Average daily gains (g/d) were calculated as differences between final and initial body weights divided by the number of days of feeding on confinement. Feed conversion ratio was measured by dividing the total amount of feeds consumed over the body gain in weight by the pigs.

Return above feed cost was computed by determining the total amount of feed consumed by the animals in kilogram as well as the other feed additives and supplements offered (e.g. yeast,vitamins, minerals) throughout the duration of the feeding trial then multiply it by the cost of the feeds/additives. The value will be deducted from the assumed sales of the pigs in kilogram liveweight based on the current market price.

2.6 Statistical Analysis

The growth parameters and the return above feed cost were examined by analysis of variance for a complete randomized design using the Assistat statistical package. Differences between means were compared using the Tukey’s test and regarded significant when $p<0.05$.

3. Results and Discussion

3.1 Feed Intake

The animals were given their daily total feed requirements based on 3% of the total live weight on a dry matter basis (Table 1) . Pigs with 0.3% ADY consumed more feeds than the rest of the treatments while pigs with 0.0% ADY consumed the least throughout the 105 days feeding period. The feed intake of the pigs were found not significant which implies that the animals have comparable amount of feed intake.

Table 1. Feed intake of the pigs supplemented with different levels of active dry yeast.

Treatments	Day 1	14 days	30 days	60 days	90 days	105 days
T1 0.0% ADY	0.33	0.51	0.71	1.25	1.97	2.29
T2 0.2% ADY	0.35	0.50	0.71	1.28	1.96	2.31
T3 0.3% ADY	0.34	0.49	0.77	1.41	2.09	2.34
T4 0.4% ADY	0.35	0.53	0.74	1.32	2.07	2.30

3.2 Growth Performance

The growth performance of weanlings during the 105 days of feeding with active dry yeast in the ration is presented in Tables 2 and 3. Mean initial body weights of the weanlings in the four feeding groups ranged from 10.93 to 11.83 kg. The differences between the means were found not significant which implies that all the animals used in the study were all of comparable weights.

3.3 Initial Weight

Mean initial body weights of the weanlings in the four feeding groups ranged from 10.93 to 11.83 kg. The differences between means were found not significant which implies that all animals used in the study were all comparable weights.

Table 2. Initial 14th day weight, monthly and final weights (kg) of the pigs supplemented with different levels of active dry yeast.

Treatments	Initial wt (kg)	14 days	30 days	60 days	90 days	105 days
T1 0.0% ADY	10.93	17.0	23.8	41.7	65.7	76.3
T2 0.2% ADY	11.83	16.8	23.5	42.7	65.3	77.0
T3 0.3% ADY	11.33	16.3	25.7	47.0	69.7	78.0
T4 0.4% ADY	11.67	17.7	24.5	44.0	69.0	76.7
	ns	ns	ns	ns	ns	ns
Cv%	18.57	18.94	21.26	20.46	18.01	18.83

3.4 Growth performance of pigs during the feeding trial

The average weight of the experimental pigs at 14, 30, 60, 90, and 105 days are presented in Table 2 and Figure 1. At 14 days of supplementing the pigs with active dry yeast, the pigs in Treatment 4 (0.4% yeast) obtained the highest mean weight of 17.7 kg while the lowest was those in Treatment 3 (0.3% yeast) with 16.3 kg. At 30 days of feeding, pigs in Treatment 3 (0.3% yeast) gained the highest mean weight of 25.7 kg followed closely by pigs in Treatment 4 (0.4% yeast; 24.5 kg) and Treatment 2 (0.2% yeast; 23.5 kg). After 2 months of feeding animals in Treatment 3 showed the highest body weight of 47.0 kg whereas pigs in Treatment 1 (0% yeast) showed the lowest body weight (41.7 kg). On the 90th day of feeding, pigs in Treatments 3 (0.3% yeast) and 4 (0.4% yeast) performed better (average weights of 69.7 and 69.0 kg respectively) than Treatments 1 and 2 (average weights of 65.7 and 65.3 kg). During the final week of feeding Treatment 3 (0.3% yeast) obtained the highest mean weight (78.0 kg; $p>0.05$) followed by Treatments 2 (0.2% yeast; 77.0 kg), 4 (0.4% yeast; 76.7 kg) and 1 (0% yeast; 76.3 kg). It is observed that the inclusion of 0.4% yeast resulted to a decreased weight of the pigs one month after the start of the feeding trial and onward. This result was similar to the findings of Korkmaz *et al.*, (2011) that at 40% level of dried bakers yeast (DBY) substitution to fishmeal in the diets of fish Koi, it reduced Weight Gain (WG). This could be attributed to the low digestibility of yeast because of the presence of cell wall and high nucleic acid (Schneider *et al.*, 2004).

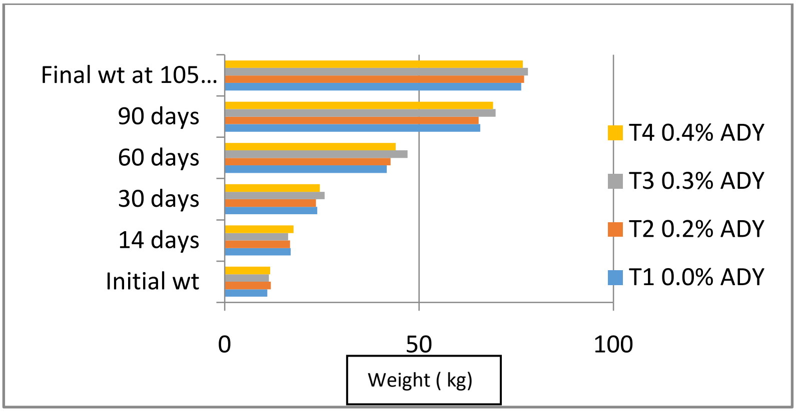

Figure 1. Average weights of the experimental animals from day 1 to day 105 of supplementing active dry yeast in the ration

During the conduct of the feeding experiment no mortality was recorded. With no significant difference in the body weights of the pigs, this implies that the inclusion of active dry yeast in the diet did not affect the weights of growing pigs.

3.4 Average Daily Gain

The average daily gain of pigs fed with different levels of active dry yeast is presented in Table 3 and Figure 2. Inclusion of 0.3% active dry yeast (T3) in the diet resulted in the highest average daily gain (635.0 g/day) whereas those fed with 0.4% active dry yeast had the lowest average daily gain (619.0 g/day). However, the differences were not significant which implies that the supplementation of active dry yeast in the ration did not affect the average daily gain of the pigs under study.

Table 3. The average daily gain, average gain in body weight, feed conversion efficiency and return above feed cost of pigs fed with different levels of active dry yeast (g).

Treatments	Average Daily Gain (g)	Average gain in body weight (kg)	Feed Conversion Ratio	Return above feed cost (Php)
T1 0.0% ADY	623.0	65.4	3.26	584.64
T2 0.2% ADY	620.7	65.2	2.89	641.72
T3 0.3% ADY	635.0	66.7	2.83	840.26
T4 0.4% ADY	619.0	65.0	2.93	443.80
	ns	ns	ns	ns
Cv%	20.17	20.17	26.16	29.13%

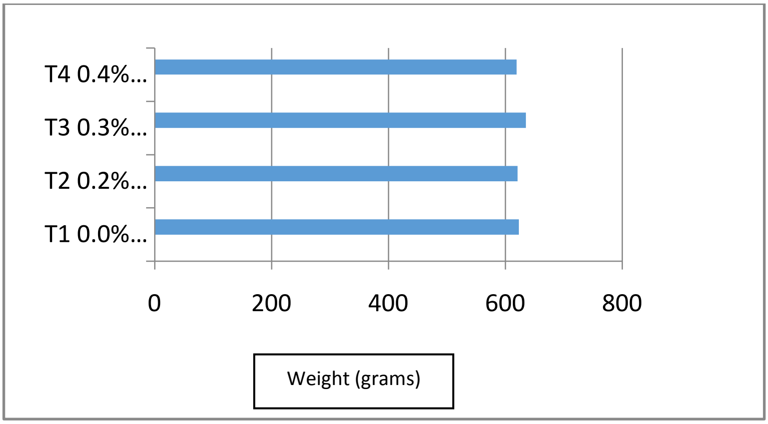

Figure 2. Average daily gain of the pigs fed with different levels of active dry yeast in the ration.

3.5 Average Gain in Weight

Table 3 shows the average gain in weight of the pigs fed with different levels of active dry yeast. Pigs in Treatment 3 (0.3% ADY) gained the highest weight (66.7 kg) while the lowest was those in Treatment 4 (0.4% ADY; 65.0 kg). Korkmaz *et al*., (2011) made a similar conclusion that at 40% level of dried bakers yeast (DBY) to the diets in pigs it reduced Weight Gain (WG), Yeast hydrolyzed protein showed a strong tendency to improve weight gain (Spring *et al.*, 2011) . However, the increase in body weight gain due to different feeding treatments were not significant, implying the pigs was not affected by the active dry yeast supplementation in the ration.

3.6 Feed Conversion Efficiency

The average feed conversion efficiency of pigs supplemented with active dry yeast is shown in Table 3 and Figure 3. All experimental animals received the same amount of feeds during the 105 days feeding period. Animals with lower average feed conversion efficiency value are more efficient in converting feeds into muscles and tissues. Pigs in Treatment 3 (0.3% ADY) which need only 2.83 kgs of feed for every kilogram gain in weight were the most efficient in converting the feeds into meat compared to other feeding treatments. This was in contrast to pigs in Treatment 1 (no active dry yeast in the ration) which had to consume more (3.26 kg/day) in order to reached a kilogram gain in weight. As a whole, there was an improvement of 10 to 13% in the feed conversion ratio of the animals given yeast supplementation, which was comparable to lambs (10-15% increase in FCR) supplemented with yeast (Webster, 2004) but the effects seen in the present studies were not significant.

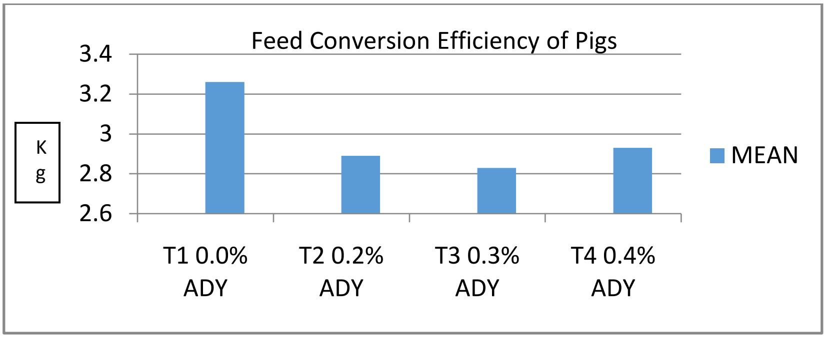

Figure 3. Feed conversion efficiency of pigs supplemented with different levels of active dry yeast.

The same observation was mentioned by Ningal (2008) that feed conversion ratio was affected by the supplementation of yeast in the ration with calves. This result could be attributed to the stimulation of growth and activity of fibre-degrading bacteria present in the active dry yeast (R. J. Wallace, *et al.*, 2007*)*. Heugten and Dorton (2001) in their study with growing pigs, revealed that Feed efficiency (gain/feed) tended to be improved in pigs fed commercial type diets with yeast compared to those not fed with yeast . Yeast hydrolyzed protein showed a strong tendency to improve weight gain (Spring *et al.*, 2011) . Molist *et al.,* (2014) also observed an improvement in feed conversion ratio. In piglets fed with 2 g Progut®/kg for 28 days after weaning. Yeast culture and live yeast often are included in ruminant feeds as a rumen stimulant or modulator but they may also play a significant role in pig and poultry feed (Stone 2002).

3.7 Return Above Feed Cost

Figure 4 shows the return above feed cost of the pigs supplemented with active dry yeast in the ration. Control animal had return above feed cost of P584.64. Treatment 3 (0.3% yeast) had the highest return above feed cost (P840.26) followed by Treatment 2 (0.2% yeast; P641.72) and Treatment 4 (0.4%yeast; P443.80). During the feeding trial, all pigs received the same amount of feeds, nevertheless, pigs supplemented with active dry yeast seemed to show better return above feed cost except for pigs with 0.4% yeast supplementation which got the lowest return. However, statistics failed to show significant difference among treatment means which shows that all treatments had comparable return above feed cost.

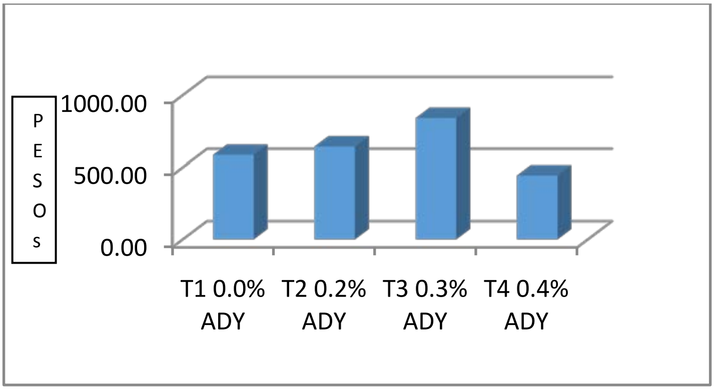

Figure 4. Return above feed cost of pigs supplemented with different levels of active dry yeast.

4. Conclusions and Recommendations

The present study revealed that active dry yeast supplementation up to 0.3% may give a better final weight and feed conversion efficiency compared to unsupplemented animals.

Yeast supplementation to diets in pigs appears to improve pig performance but the results failed to show significant differences on the final weight, body weight gain, average daily gain, feed conversion efficiency and return above feed cost of the pigs.

Further study is recommended to evaluate the potential of active dry yeast supplementation in the ration of other monogastric animals.

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