



Potential of Enhanced Formulated Probiotic (Provet) as Dietary Supplement for Growing-finishing Pigs

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ABSTRACT

Background: The study entitled "Potential of Enhanced Probiotic as Dietary Supplement for Growing-finishing Pigs" was conducted at Agriculture Instructional, Research and Production Units, Apayao State College, conner campus. This study aimed to evaluate its potential as dietary supplement for growing-finishing pigs in terms of body weight, gain in weight, average daily gain (ADG), Feed Consumption and Feed Conversion Ratio and the Return on Investment (ROI). Probiotic are live microorganisms that when it is used in right amount, it improved health, digestibility and fast nutrient absorption towards significant growth performance and feed efficiency. Commercial probiotics which are evidently available in the market and easily procured by raisers. However, its price is so high and revealed its increasing expenditures that cause low net income. With that, a cheapest probiotic; safe both human and the animals, decreasing production expenses. and environmental-friendly was formulated. Hence, the study was conducted to see the potential of enhanced probiotic (Provet) as dietary supplement for growing-finishing pigs

Methods: The study was laid out using the completely randomized designed (CRD). The least significance difference (LSD) was used for the comparison of means, if the result is significant. The treatments as basis of comparison were Treatment 1- Control (No Probiotic), Treatment 2. Commercial Probiotic, Treatment 3. 20 ml of Enhanced Formulated Probiotic (EFP), Treatment 4. 30ml of Enhanced Formulated Probiotic (EFP).

Result: Highly significant ($P < 0.01$) result were observed on the growth parameters of growing-finishing pigs such as body weight, gain in weight and the average daily gain (ADG) wherein, pigs treated with 20 ml EFP took advantaged compared with the pigs in control treatment and of the pigs treated with commercial probiotic. With the body weight advantage of animals treated with 20 ml EFP, the return on investment (ROI) revealed significant advantage compare with the pigs in the other treatments. It is therefore concluded, that the 20 ml EFP showed potential as dietary supplement on the growth parameters of growing-finishing pigs, its utilization significantly affecting the return on investment and safe to use for animal consumption. Therefore, it is recommended to use the 20 ml enhanced formulated probiotic and best to mixed with feeds and be utilized by pigs in the morning. Further recommended to conduct a verification trial on the efficacy of 20 ml enhanced formulated probiotic in same age of pig to finally confirm its significant impact to the growth and income of raising growing-finishing pigs. Furthermore, study on the use of enhanced formulated probiotic be also conducted for early and post weaning piglets and gestating sow.

Key words: Dietary supplement, Growth potential, Probiotic.

INTRODUCTION

Pig farming is one of the most profitable livestock industries in the Philippines and other countries in the world. Both commercialized piggery farm and backyard pig raising contributed in meeting the pork meat demands. Aside of low farmgate prices which our piggery raisers had been experienced, the outbreak of diseases like the African Swine Fever (ASF) truly devastated our piggeries and shorted of pork in the market was significantly affected. Increasing the immune system of the animals is one of the best keys to ensure productivity and avoid high mortality due to disease outbreak. The health condition of the animals is now the most challenging issue that need to be addressed immediately before lost and bankruptcy may occur. The use of synthetic or commercialized feeds, biologics and supplements are mostly the adapted by our raisers which a significant increases of production expenses were observed and thus, low production income have been experienced. Engagement to piggery production is not only focused on sustainability of production and income, but also considered safe products for consumers and

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environmental-friendly animal raising. To improve growth performance of growing-finishing pigs, dietary supplementation is somewhat advisable. Substituting the synthetic supplementation for pigs, an enhanced formulated probiotic (Provet) was produced. This dietary supplement was subjected to laboratory analysis through the bureau of animal industry (BAI), Department of

Agriculture, Quezon City, Philippines. Result showed that the enhanced formulated probiotic (Provet) has *Bacillus spp.* identified as beneficial bacteria affecting digestibility and fast nutrient utilization resulting to significant impact on the growth of growing-finishing pigs. Wang *et al.* (2023) concluded that probiotics could improve the growth performance, feed intake and efficiency, rumen fermentation, immune and antioxidant capacity and health of pre-weaning calves. Balasubramanian *et al.* (2016) stated that dietary supplementation with bacillus spp. probiotic prepared at 0.2% is effective in improving the growth performance, nutrient digestibility of dry matter, fecal microbiota, glucose level, sensory evaluation of meat color, drip loss and carcass weight and grades in pigs without affecting average daily feed intake. Hossain *et al.* (2024) stated that the use of probiotics, prebiotics, dietary enzymes and medicinal plants in animal diets has been explored as means of reducing harmful gas emissions. Al-Shawi *et al.* (2020) concluded from their findings using probiotics seems to improve gut microbiota composition, immune response, nutrient digestibility and absorption, animal growth and meat quality. Kalita *et al.* (2024) concluded from the observation of their study that dietary inclusion of probiotic and zinc might be led to immunomodulation in the small intestine of piglets. Narayana and Subramonian, (2023) stated that the probiotic regime had positive effects on the health of piglets when compared to the control group. Thus, these probiotic bifidobacteria can be considered as safe adjuncts for preparation of dairy nutraceuticals. Rathod *et al.* (2025) stated that the regular feeding of probiotic strains, both individual and combined, my shows greater effect on absorption and utilization of feeds, daily increase body weight and total body weight of livestock. Evidence on feeding of probiotics resulted in improved quality and quantity of milk, meat and eggs available.

Objectives

Generally, the study was conducted to evaluate the potential of enhanced formulated Probiotic as dietary supplement for growing-finishing pigs. Specifically, to determine the effects of the enhance formulated Probiotic (Provet) to the growth parameters of the growing-finishing pigs such body weight, gain in weight, average daily gain (ADG), Feed consumption and feed conversion ratio and the return on cash expenses (RoCE).

MATERIALS AND METHODS

This study was conducted at piggery laboratory facility, agriculture instructional research and production unit of the agriculture department, Apayao State College, Cubet-malama, Conner, Apayao. 12 heads of experimental animals, 45 days old growing-finishing pigs were used from the biological asset of the Agriculture Department, Apayao State College, Conner, Apayao. Nutrition and health concerns such as vaccination, disease treatments, deworming programs, hygiene and sanitation, waste

disposal and biosecurity measures were adopted to ensure significant impact of the study. The experimental animals were fed at 9:00 in the morning and 4:00 in the afternoon. Treatment was given and mixed with the feeds offered in dry method and best apply in the morning feeding schedule. The enhanced formulated Probiotic was produced based on the recommended ratio of ingredients such as 250 grams-Garlic, 250 grams-Ginger, 250 grams-Hot Chilli, 250 grams-Papaya peel (green), 1 bottle Yakult, 1-liter finished product IMO, 1 kg Molasses, 20 liters clean unchlorinated water, thoroughly mixed and done in a proper fermentation process. The EFP was done through the following steps such as formulate IMO for 7 days (If no available or ready IMO), prepare and grind garlic, ginger, hot chilli and papaya peel, place the grinded garlic, ginger, hot chilli and papaya peel using the mesh screen and tied with rubber bond, place 20 liters of clean and unchlorinated water inside the plastic pail, open 1 bottle of Yakult and mix it with the 20 liters water, add and mix 1 liter of IMO, 1 kilogram of molasses stir it thoroughly and place inside the pail the grided garlic, ginger, hot chilli and papaya peel that placed inside the mesh screen, cover the plastic pail with manila paper, tied it thoroughly and allow fermentation for 14 days before harvesting, in order not to forget the date of harvesting, write at the manila paper the date of formulation (DOF) and the date of harvest (DOH), prepare a sterilized bottle; preferably glass bottle not plastic for the harvesting of EFP or Provet probiotic, at harvesting, placed the EFP using sterilized bottle, cover the bottle with the use of paper doubled with clothes and tied it with rubber bond, to ensure its longer use, best to place or store the enhanced formulated probiotic (Provet) inside refrigerator. The enhanced formulated probiotic (Provet) was recommended to offer based on the treatments of the studies. The EFP was started to apply at 46 days up to 152 days old of the experimental animals. It is best to offer the enhanced formulated probiotic at the first feed offering mixed it directly with the feeds at least 9:00 in the morning. The study was laid out using the completely randomized designed (CRD). The least significance difference (LSD) was used for the comparison of means, if the result is significant. Treatment 1. Control (No Probiotic mixed with feed), Treatment 2. Commercial probiotic mixed with feed, Treatment 3. 20 ml enhanced formulated probiotic (EFP) mixed with Feed, Treatment 4. 30 ml enhanced formulated probiotic (EFP)) mixed with Feed. The data were gathered with the different growth parameters such as initial and body weights per growth stages, wherein the initial weight of the experimental animals was taken at the first day before treatments was applied. Thereafter, the body weight recorded per growth stages until market age was reached. The Gain in weight, in which the gain in weight of the experimental birds was taken by subtracting the initial weight from the final weight. Average daily gain (ADG)- The ADG was computed by dividing the gain in weight per growth stage (kg) over the number of fattening days. The feed consumption, in which

the experimental animals in the different treatments were done by taking into account the volume of feeds consumed and the volume of feeds offered. The volume of feed leftover will be subtracted from the feeds offered to determine the actual feed consumption. Feed conversion ratio (FCR). And the return on investment cash expense (RoCE). All the data that were gathered was tabulated and analyzed using the analysis of variance following the completely randomized design (CRD). Comparison between treatment means will be conducted using the least significant difference if the means for the F-values will be significant.

RESULTS AND DISCUSSION

Body weight of growing-finishing pigs (kg)

The Initial weight and the succeeding body weights of growing -finishing pigs influenced by enhanced formulated probiotic (EFP) as dietary supplement is presented in Table 1. Comparable result was observed in the initial weight of the piglets at the beginning of the study. After 10 days of feeding mixed with respective treatments, analysis of variance revealed highly significant difference ($P<0.01$) on the first body weight, wherein 20 ml EFP statistically the same of that in the 30 ml EFP and significantly different to commercial probiotic and the control treatment. At the starter age of the pigs raised within 36 days period, highly significant result ($P<0.01$) was again observed. 20 ml EFP (T3) garnered the highest body weight resulting to 36-kilogram body weight, a weight advantaged over the other treatments. Same highly significant result was observed during the growing and finishing stage of the animals.

Animals treated with 20 ml EFP consistently showed highly significant advantaged over commercial probiotic (T2) and the control treatment (T1). The study implies that the enhanced formulated probiotic revealed its potential as dietary supplement to the growing-finishing pigs and significantly contributed to the target body weight of 80 kilogram at the period of 107 days or 3.5 months of growing management. Surely, the bacillus spp. present from the enhanced formulated probiotics (Provet) as dietary supplemented positively influenced growth performance. Result was in conformed with the study of Li *et al.* (2023) that additional probiotics in the diet can modulate intestinal health, improve the digestibility of nutrients and thus, help improve the nutrient utilization and production performance of pigs.

Gain in weigh of growing-finishing pigs (kg)

Table 2 shows the gain in weight of the growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement. Analysis of variance revealed that the enhanced formulated probiotic (Provet) had potential to use as dietary supplement to growing-finishing pigs. Study showed that in the whole duration of the study given different level of feeds such as pre-starter, starter, grower and finisher, it was the enhanced formulated probiotic (Provet) with 20 ml mixed with feeds as dietary supplement showed consistent highly significant advantaged ($P<0.01$) compared with pigs consumed commercial probiotic (T2) and the animal in control treatment (T1). However, result of the study at the finisher level found that treatments 4, 3 and 2 were observed comparable with each other and significantly

Table 1: Initial and body weight (Kg) of growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement.

Treatment	Initial weight	Body weight (KG) per age level			
		Pre-starter (10 days)	Starter (36 days)	Grower (30 days)	Finisher (31 days)
1- Control (No Probiotic mixed with feed)	5.00	10b	30b	55b	77b
2- Commercial probiotic mixed with feed	5.03	10b	30b	55b	82a
3- 20 ml EFP Mixed with Feed	5.00	13ab	36a	61a	86a
4- 30 ml EFP Mixed with Feed	5.00	14a	31a	56a	80a
ANOVA	ns	**	**	**	**
C.V.	3.75				
LSD		3.36	3.36	3.62	3.36

Table 2: The gain in weight (kg) of growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement.

Treatment	Gain in weight (KG) per age level			
	Pre-starter	Starter	Grower	Finisher
1- Control (No probiotic mixed with feed)	5.00b	25.00b	50.00b	69b
2- Commercial probiotic mixed with feed	4.97b	25.00b	49.97b	72a
3- 20 ml EFP Mixed with Feed	8.00a	31.00a	56.00a	78a
4- 30 ml EFP Mixed with Feed	9.00a	26.00ab	51.00ab	72a
ANOVA	**	**	**	**
CV				
LSD	3.50	3.16	4.08	4.70

different with the animals in treatment 1 as revealed on the analysis of variance. It was clearly implied that the bacillus spp. in the enhanced formulated probiotic (Provet) significantly influenced digestibility and nutrient utilization. Hence, the gain in weight advantage was observed compared with the other treatments. Finding was supported by the findings of Sampath *et al.* (2021) 0.3% probiotic supplement had significantly increased body weight and therefore the dietary probiotics with high-nutrient density (HD) diet increased the growth performance, nutrient digestibility, blood profile and reduced gas emission and this could serve as an alternative feed additive to enhance the growth performance of growing pigs.

Average daily gain (ADG) of growing-finishing pigs (Kg)

The average daily gain (ADG) of growing-finishing pigs treated with enhanced formulated probiotic (Provet) as dietary supplement is presented in Table 3. Analysis of variance had shown highly significant ($P < 0.01$) difference in all levels within the entire duration of the study. It was the 20 ml enhance formulated probiotic (Provet) consistently took advantage over the commercial probiotic and the control treatment. However, at the finisher level of the growing-finishing pigs, animals treated with enhanced formulated probiotic (Provet) and of the commercial probiotic were statistically comparable ($P < 0.01$) with each other but significantly different to animals in treatment 1 (Control). This implies that the Enhanced Formulated Probiotic with 20ml mixed with feeds as dietary supplement

significantly contributed in the average daily gain of the growing-finishing pigs. Result is in conformed with the findings of Liu *et al.* (2018) that administration of probiotics improved average daily gain ($p < 0.05$) 0-14 days and the overall period.

Feed consumption of growing-finishing pigs (Kg)

Table 4 shows the total feed consumed of growing-finishing pigs treated with enhanced Formulated probiotic as dietary supplement. Highly significant result ($P < 0.01$) was observed during the pre-starter age of the growing-finishing pigs. Analysis of variance revealed that animals in treated with 20 ml and 30 ml enhanced formulated probiotic (Provet) was found comparable, while significantly different with animals in treatment 2 with 5 grams commercial probiotic and animals in treatment. From the remaining levels of the pigs, it was found that no significant different was observed with all the treatment. Data showed that all of the animals consumed the same volume of feeds disregarding the application and treatment of dietary supplement.

Feed conversion ratio of growing-finishing pigs (Kg)

The feed conversio ratio of growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement is shown in Table 5. No significant result was observed in the pre-starter age of the animals in all treatments. However, highly significant ($P < 0.01$) results were found at the end of the starter up to the finisher age of the animals as revealed on the analysis of variance. Based on data,

Table 3: The average daily gain (Kg) of growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement per age level.

Treatment	Average daily gain (Kg) per age level			
	Pre-starter	Starter	Grower	Finisher
1- Control (No probiotic mixed with feed)	0.50b	0.69b	1.67b	2.32b
2- Commercial probiotic mixed with feed	0.50b	0.69b	1.67b	2.48ab
3- 20 ml EFP Mixed with Feed	0.80a	0.86a	1.87a	2.61a
4- 30 ml EFP Mixed with Feed	0.90a	0.72a	1.70a	2.42ab
ANOVA	**	**	**	**
C.V.				
LSD	.0.35	0.09	0.14	0.10

Table 4: The total feed consumed (Kg) of growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement per age level.

Treatment	Total feed consumed (Kg) per age level				Total feed consumed per pig (Kg)	Feed consumed per pig (BAG)
	Pre-starter	Starter	Grower	Finisher		
1- Control (No probiotic mixed with feed)	4.23	38.30	52.46	69.70	164.69	3.29
2- Commercial probiotic mixed with feed	4.29	36.94	52.48	69.70	163.41	3.27
3- 20 ml EFP Mixed with feed	4.68	38.89	52.61	69.70	165.88	3.32
4- 30 EFP Mixed with feed	4.66	38.05	52.74	69.70	165.15	3.30
ANOVA	**	ns	ns	ns		
C.V.		310.63	1.31	0.13		
LSD	8.55					

Table 5: The feed conversion ratio (Kg) of growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement per age level.

Treatment	Feed conversion ratio (Kg)			
	Pre-starter	Starter	Grower	Finisher
1- Control (No probiotic mixed with feed)	0.87	1.47b	1.09b	0.97b
2- Commercial probiotic Mixed with feed	1.00	1.42b	1.09b	0.91b
3- 20 ml EFP Mixed with feed	0.59	1.21a	0.97a	0.86a
4- 30 ml EFP Mixed with feed	0.52	1.41b	1.07b	0.93b
ANOVA	ns	**	**	**
C.V.	36.64			
LSD		0.17	0.09	0.04

Table 6: Return on cash expense of growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement.

Particulars	Treatments			
	1	2	3	4
Total sold sacks	33	33	33	33
Average weight of pig (Kg)	77	82	86	80
Price per kilogram body weight (Liveweight)	200	200	200	200
Sold liveweight per pig	15400	16400	17200	16000
Total gross income (Sold Pig and Sacks)	15433	16433	17233	16033
Total sold sacks	33	33	33	33
Price of piglet	4000.00	4000.00	4000.00	4000.00
Grand total of feeds consumed per pig	6269.93	6221.74	6328.24	6299.14
Amount consumed commercial probiotic and provet	0.00	401.25	35.10	52.64
Total expenditures on feeds and supplement	6269.93	6622.99	6363.34	6351.78
Net income	9,163.07	9,810.01	10,836.66	9,681.22
Return on cash expense (ROCE)	59.37	59.70	62.88	60.38

animals in treatment 3 treated with 20 ml EFP was statistically different compared with animals in treatments 2 and 1. This implies that the EFP significantly contributed in converting feed consumed into a reasonable body weight. Further implies, that the enhanced formulated probiotic (Provet) potentially affecting the feed conversion ratio of the growing-finishing pigs. Van der Peet-Schwering *et al.*, (2020) supported the study and confirmed that during the overall period (1-102 days), probiotic supplementation significantly improved FCR ($P=0.01$) and finally revealed that *Bacillus subtilis* improved the FCR of the GF pigs during the overall fattening period.

The return on cash expense of the growing-finishing pigs treated with enhanced formulated probiotic as dietary supplement

Table 6 shows the return above feed and supplement cost. This data simply revealed the net income after enhanced formulated probiotic was used as dietary supplement to growing-finishing pigs. After computing the total gross income per treatment, it was subtracting from the total expenses, wherein net income was evidently revealed. Based on the table below, it was animals in treatment 3 treated with 20 ml Enhanced Formulated Probiotic mixed

with feed garnered the highest net income with an amount of P10,836.66 per head with an income advantage to treatment 2 of P1,026.65 and treatment 1 amounting to P1,673.58. On the other hands, animals in Treatment 4 treated with 30 ml enhanced formulated probiotic recorded a little bit income advantage compared to treatment 1 (Control) with an amount of P518.15, while treatment 2 (Commercial) was observed little bit advantage to animals in treatment 4 with an amount of P128.79. It was clearly observed that the inclusion of 20 ml enhanced formulated probiotic as dietary supplement to growing-finishing pigs have potential and significantly shows profitability among pig raisers.

CONCLUSION

The enhanced formulated probiotic (Provet) revealed its potential as dietary supplement for growing-finishing pigs that its utilization showed high significant impact on the body weight, gain in weight, average daily gain (ADG), feed conversion ratio and the return on cash expense (RoCE) in which the enhanced formulated probiotic (EFP) revealed highest income. Further concluded the 20 ml EFP mixed with feeds revealed its significant advantage over commercial probiotic as dietary supplement.

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Disclaimers

The vies and conclusion expressed in the article are solely of the author and do not necessarily represent the view of his affiliated institution. The author is responsible for the accuracy and completeness of the information provided but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the members of research unit and handling techniques were approved by the College Animal Care Committee.

Conflict of interest

The author declares that there is no conflict of interest.

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