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Effect of Supplementation of 'Diakur Plus' on Growth and Nutrient Utilization in Crossbred (Hampshire x Ghungroo) Piglets

KESHAB BARMAN[1Â], SANTANU BANIK[1], SUNIL KUMAR[1], RAJENDRAN THOMAS[1], DIPANJALI KONWAR[2], GIRISH PATIL S[3]., ANIL KUMAR DAS[1],D.K. SARMA[4], SWARAJ RAJKHOWA[1]

[1]*ICAR-National Research Centre on Pig, Rani, Guwahati, Assam*
[2]*F.V.Sc. & A.H., R.S. Pura, SKUAST-Jammu, Jammu and Kashmir*
[3]*ICAR-NRC on Meat, Hyderabad, Andhra Pradesh*
[4]*CVSc, AAU, Khanapara, Assam*
email: Keshab Barman, barman74@gmail.com

ABSTRACT

A study was conducted to see the effect of supplementation of Diakur on growth and nutrient utilization in crossbred weaned piglets. Eighteen crossbred (Hampshire x Ghungroo) piglets (about 42 days old, body wt. 7.0-7.5 kg) were divided into three groups in a randomized block design. The animals were fed namely - T_1: standard grower ration (SGR) without 'Diakur Plus', T_2: SGR plus 4 g 'Diakur Plus' and T_3: SGR plus 6 g 'Diakur Plus'. The average dry matter intake and weight gain was found similar across all the groups. Digestibility coefficients (%) of nutrients were similar (*P>0.05*) across all supplemented groups. Nitrogen balance (g/d) was found positive across all the groups. The feed conversion ratio (FCR) was improved (*P>0.05*) while cost (Rs/kg gain) was reduced (P>0.05) in supplemental groups. From this study, it is concluded that 'Diakur Plus'can be supplemented @ 6 g/d orally in crossbred piglets for better performance.

Keywords *'Diakur Plus'; Supplementation; Nutrient utilization;Crossbred piglets*

In piglets, weaning period is a very stressful event, because of change in feed as well as shifting to a new environment i.e. weaning sty. These changes, result indecreased feed intake as well as causes considerable modification in gut architecture and function, making piglets highly susceptible to gastro-intestinal diseases (Lallès*et al.*, 2004). The impact of this stress is more pronounce during first week after weaning (Campbell *et al*., 2013). However, it can be minimized to some extent by providing good housing, balanced nutrition (Xiong*et. al.*, 2019), good health hygiene as well as other managemental practices (Campbell *et al*., 2013). Different nutritional interventions can be applied to cope with this stress (Lallès*et al.*, 2007; Xiong*et. al*., 2019; Nowak *et al*., 2019), including supplementation of feed additives or other substances that improve the feed intake and improve the immunity of the piglets.Piglets often suffer from post weaning diarrhoea due to rapid proliferation of pathogenic bacteria that causes imbalance of intestinal microbiota (Tao *et al*., 2015; Bäumler and Sperandio, 2016; Gresse*et al.*, 2017). Diakur Plus is one of such nutritional supplement that improve the piglets performances. 'Diakur Plus' is a product of Boehringer Ingelheim India Pvt. Ltd, Mumbai, India. In a study, Kazuaki and Yukio (2002) reported that supplementation of Diakur (an oral glucose and electrolyte supplementation) prevent the growth depression effect of high temperature and also maintained some physiological and immunological responses in male broilers.

In the present study, 'DiakurPlus' was used at different levels to see its effect on growth, nutrient utilization and incidence of diarrhea in crossbred piglets.

MATERIAL AND METHODS

The study was carried out at ICAR –National Research Centre on Pig Farm Rani, Guwahati, Assam, India.It was carried out after the approval by the Institute Animal Ethic Committee for providing necessary protection of animals used for experimental and other scientific purposes.Animals were housed in a well-ventilated sty. Drinking water was available round the clock and feeding was done twice daily at 10 AM and 3:00 PM respectively.

Table 1: Ingredient composition of experimental feed

Ingredients	Parts (W/W), %
Maize crush	65.0
Wheat bran	9.5
Soyabean meal	12.0
Ground nut cake	12.0
Mineral mixture	1.0
Salt	0.5
Total	100.0
Limestone	1.5
Phytase, g	40
Lysine	1

Eighteen crossbred (Hampshire x Ghungroo) piglets (about 42 days old, body wt. 7.0-7.5 kg) of either sex were divided into three groups of six each in a randomized block design immediately after weaning.The experimental animals werefed namely - T_1: standard grower ration without 'Diakur Plus', T_2: standard grower ration 4 g 'Diakur Plus' and T_3: standard grower ration plus 6 g 'Diakur Plus' (Table1).'Diakur Plus' contains glucose, inactivated yeast hydrophobic citrus fibre, balanced electrolytes and buffer.

Lysine and phytase were balanced in all the rations according to requirement. The pigs were fed on the experimental grower rations twice daily in the morning and evening. The nutrient requirement of pigs was made as perBureau of Indian Standard (BIS, 1986). The experiment was conducted for 30 days. 'Diakur Plus'was given orally after dissolving in water with the help of syringe. Fortnightly body weight of the experimental animals was recorded using digital balance. A metabolic trial for 5 days duration was conducted at the middle of the experiment.

Proximate composition was done as per AOAC (1990).N-balance was calculated from difference between the total N intake and excreted. Nitrogen absorbed was calculated from the difference between total N intake and faecal N excretion.

The proximate composition, dry matter intake, nutrient digestibility and nitrogen utilization were analyzed using general linear model (GLM) (PROC GLM) in SAS 9.4 (SAS institute Inc. 2014, USA). The model included the effects of three diets on response variables. Least squares means were calculated per experimental diet and statistical differences between least squares means were determined using a post hoc Duncan test. The P-values <0.05 were considered significant and *P*-values between 0.05 and 0.10 were considered indicative of a trend.

RESULTS AND DISCUSSIONS

The crude protein content (% DM) of the experimental rations was18.21±0.38(Table-2). Nitrogen free extract content (% DM) of the experimental rations was 67.18±1.37.

The average dry matter intake (g/d) was 356.65±1.92, 352.35±2.22 and 348.06±4.84 respectively in T_1, T_2 and T_3 groups respectively and was found similar across all the groups (Table 4). Dry matter intake was slightly decreased (P>0.05) in T_2 and T_3 group in comparison to T_1 group which might be due to glucose content of the 'Diakur Plus'. Clouard*et al*., (2016) reported that intake of refine sugar affect the feed intake in weaned piglets.

The average daily gain (ADG, g/d) was 189.67±32.07, 219.00±27.78 and 204.33±20.70 respectively, in groups T_1, T_2 and T_3. Growth was improved (P>0.05) at supplementation of 'Diakur Plus' to the piglets.

The feed conversion ratio (FCR) was improved (P>0.05) in T_2 and T_3 groups in comparison to T_1

Table 2: Chemical composition of experimental feed

Ration	OM %	CP %	CF%	Ash %	EE	NFE %
	94.68±0.33	18.21±0.38	6.06±0.48	5.21±0.27	3.89±0.25	67.18±1.37

OM=organic matter; CP=Crude Protein; CF=Crude fiber, EE=Ether extract; NFE= Nitrogen free extract

Table 3: Effect of supplementation of 'Diakur Plus' on digestibility coefficients of nutrients

Group	DM	OM	CP	EE	CF	NFE
T_1	60.38±0.32	63.94±1.48	79.69^{a}±0.45	50.90±5.26	56.88^{a}±0.47	61.12±2.31
T_2	63.26±1.70	67.65±2.18	82.41^{b}±0.67	51.83±0.94	61.31^{b}±0.70	65.20±2.89
T_3	61.89±1.42	65.56±1.44	81.55^{b}±0.12	55.90±3.45	63.01^{b}±2.54	62.09±1.57
P Value	0.402	0.424	0.056	0.637	0.134	0.511

T_1: supplementation of 'Diakur Plus' @ 0 g/animal/day; T_2: supplementation of 'Diakur Plus'@ 4 g/animal/day T_3: supplementation of 'Diakur Plus'@ 6 g/animal/day, ^{a,b}differentsuperscript in a column differ significantly (P<0.05)

group.Similarly, Jacela*et al*., (2009) reported that addition of acidifiers and antibiotic additives improved the production performance in growing pigs.The feed cost/kg gain was 61.86±12.10, 49.53±6.93 and 51.35±6.58 respectively in groups T_1, T_2 and T_3 respectively(Table 4). The feed cost per kg gain was reduced by Rs. 12.33 and Rs. 10.51 respectively in T_2 and T_3 groups in comparison to T_1 group. Similarly, Lin *et al.*, (2020) also reported that supplementation of Chinese herbal feed additives can reduce the cost

Table 4: Effect of supplementation of 'Diakur Plus' on nutrient utilization

	T_1	T_2	T_3	P value
Nutrient utilization				
**DM intake, g/day/animal	356.65±1.92	352.35±2.22	348.06±4.84	0.210
Average initial body weight, kg	7.48±0.57	7.48±0.45	7.46±0.56	0.999
Average final body weight, kg	13.17±1.79	14.05±1.90	13.59±1.07	0.752
Average gain, g	189.67±32.07	219.00±27.78	204.33±20.70	0.754
Feed conversion ratio	2.52±0.49	2.01±0.28	2.09±0.27	0.586
Feed cost/kg gain(As such basis)	61.86±12.10	49.53±6.93	51.35±6.58	0.586
N- balance				
N intake, g	10.32±0.04	10.24±0.09	10.13±0.03	0.127
N excretion, g				
Faecal excretion, g	1.99^{a}±0.04	1.71^{b}±0.05	1.78^{b}±0.01	0.023*
Urinary excretion, g	0.72±0.09	0.76±0.05	0.69±0.03	0.709
Total excretion, g	2.71^{a}±0.03	2.47^{b}±0.01	2.46^{b}±0.02	0.021*
N balance	7.66±0.01	7.78±0.09	7.67±0.01	0.362

T_1: supplementation of 'Diakur Plus' @ 0 g/animal/day in water orally; T_2: supplementation of 'Diakur Plus'@ 4 g/animal/dayin water orally T_3: supplementation of 'Diakur Plus'@ 6 g/animal/dayin water orally; ^{a,b,c}different superscript in a row differ significantly (*, P<0.05);

of pig breeding and also produces high quality pork.

The digestibility coefficients (%) of dry matter, organic matter, crude protein, ether extract, crude fiber and nitrogen free extracts increased (P>0.05) by 2.85, 3.71, 2.72, 0.93, 4.43 and 4.08 % respectively in T_2 group while same was increased (P>0.05) by 1.51, 1.62, 1.86, 5.00, 6.13 and 0.97 % in T_3 group in comparison to T_1 group(Table 3). Protein and crude fiber digestibility significantly (P<0.05) improved in supplemented groups in comparison to contro group. 'Diakur Plus' supplementation improved (P>0.05) the digestibility of nutrients in crossbred piglets.

Nitrogen intake (g/d) was 10.32±0.04, 10.24±0.09 and 10.13±0.03 respectively in groups T_1, T_2 and T_3(Table 4). Faecal excretion of N decreased (P<0.05) with increased level of Diakursupplementation. However, an irregular pattern of excretion of N (g/d) through urine was observed across the groups. Nitrogen balance (g/d) was found positive and similar across all the groups and values were 7.66±0.01, 7.78±0.09 and 7.67±0.01 in groups T_1, T_2 and T_3 respectively (Table 4).Nitrogen balance was slightly improved (P>0.05) at T_2 and T_3 groups in comparison to T_1 group. This might be due to presence of glucose in the 'Diakur Plus', as supplementation of glucose also improved nitrogen status in transition dairy cows as reported by Osborne *et al*., (2002).

The incidence of diarrhea was observed in two experimental piglets in control group while none of the piglets suffered from incidence of diarrhea in supplemented groups. Probably the presence of yeast in 'Diakur Plus' might be helpful in reducing the incidence of diarrhoea in supplemental piglets. Thus, 'Diakur Plus'can be used to reduced incidence of diarrhea in weaning piglets. Other authors (Patterson *et al*., 2019, Satessa*et al*., 2020) also reported that supplementation of feed additives reduced the incidence of dirrhoea in weaned piglets.

From this study, it is concluded that 'Diakur Plus' can be supplemented @ 6 g/d orally in crossbred piglets for better growth, nutrient utilization, feed conversion efficiency and also to economize the feed cost. Incidence of diarrhea was not seen in supplemented group. However, further research is needed with higher doses of 'Diakur Plus' to achieve significant result.

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