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Effect of Dietary Supplementation of Probiotic on Haematological Profile of Neonatal Pig during Pre-weaning Period

Nanda Kumar Roy[1]*, Girin Kalita[2], L. Hmar[2], Ranjana Goswami[2], Dulal Chandra Mili[1], Jogi Raj Bora[1], Sayed Nabil Abedin[3] and Ekramul Hoque[4]

[1]Department of Livestock Production and Management, [3]Department of Veterinary Physiology, [4]Department of Animal Nutrition, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-22, India
[2]Department of Livestock Production and Management College of Veterinary Sciences and Animal Husbandry Central Agricultural University, Selesih, Aizawl, Mizoram, India

**Corresponding author*

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A B S T R A C T

The present study was conducted to know the effect of probiotic supplementation to Pre-weaning pig on haematological profile during pre-weaning period. A total of24 number of Large White Yorkshire nursing piglets were utilized for the present study. Animals were randomly assigned into 2 equal groups; Group 1(Treatment), Group 2(Control).The probiotic supplement (Darolac) containing *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Bifidobacterium longum* and *Saccharomyces boulardii* was fed orally twice daily with a gap of 6 hours up to 7 days to the piglet @ 1 g/piglet/day twice daily in the treatment group. The control group was not fed any probiotic supplementation. Weaning was done on day 28. Blood samples of piglets were analysed for Haemoglobin, Packed Cell Volume (PCV), White blood cell (WBC) and Red bold cell (RBC) at 7th, 14th, & 28th day of experiment. The mean±SE of haematological parameters in pre-weaning piglets were in normal ranged in treatment group and control group and significance difference were observed in WBC level on day 14 of pre-weaning. However, overall haematological level at 28th day was in normal range which indicates that supplementation of probiotic during pre-weaning stage did not influence the haematological parameters in pre-weaning pigs.

Introduction

Probiotics are live microorganisms which have been found to confer a health benefit on the host when administered in adequate amounts (Weichselbaum, 2009). Probiotics are mainly used to reinforce or re-establish the gut microbial balance, especially when the hosts

are confronted with challenges or stress (Vanbelle, 2001). Some studies have suggested that administration with different microbes in early life can alter the composition of gut flora during the first weeks of life and have an impact on health in later life (Bjorksten *et al.,* 2001; Kero *et al.,* 2002). Probiotics have received considerable attention as suitable alternatives of antibiotics to promote growth in the pig industry (Chen *et al.,* 2006; Meng *et al.,* 2010; Yan and Kim, 2011).Among the various livestock species, pig is one of the most important meat producing animals around the world (McGlone, 2013). Growth and survivability of young pigs during pre-weaning period is very crucial for any pig farm. Different techniques and managemental practices were developed in the last few decades to improve the efficiency of pig production system. Many studies have conducted to see the impact of dietary supplementation of probiotics in weaned pigs. However, there is scanty of information on effect of supplementation of probiotic on performance of neonatal pigs. High mortality rate of neonatal piglets (within 7 days postpartum), higher incidence of diarrhoea and poor growth during pre and post weaning periods are the major concern in pig husbandry (Varley, 1995). Prime factors that might be responsible of neonatal mortality are low body energy reserves, poor birth weight, low intake of immunoglobulin immediately after birth and lack of required microclimatic condition for neonates.(Le Dividich *et al*.,2005), which trigger many haematological changes and further predisposing the piglet to pathogenic organisms (Almond *et al.,* 2006). Therefore, continuous monitoring of the health of the pigs becomes crucial. Blood haematological parameters are routinely used to assess the health of the animals (Pal *et al.,* 2009). In view of the above, the present study was planned to compare the health status of young pigs in terms of haematological analysis during pre-weaning period, which were fed the probiotic supplement.

Materials and Methods

Mizoram is a landlocked state in NE India whose southern part shares 722 km long International borders with Myanmar and Bangladesh, and Northern part share domestic borders with Manipur, Assam and Tripura. The study was carried out in the Pig Units of the Livestock Farm Complex, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram, India.For the purpose of the present study, 24 number of Large White Yorkshire nursing piglets were utilized. Considering the body weights, all the new born piglets in a litter were categorized into two groups viz.T_1 (treatment), and C (control). The piglets were reared with their dam in the farrowing pen up to weaning (28 days of age), wherein piglets were allowed to suckle mother's colostrum/milk at free choice during the entire study period. Creep area with brooding facility was created inside the farrowing pen to maintain required temperature for the young piglets. The probiotic namely Darolac which contains *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Bifidobacterium longum* and *Saccharomyces boulardii* was fed orally twice daily with a gap of 6 hours up to 7 days to the piglet @ 1 g/piglet/day twice daily in the treatment group. Pre-starter rations[8] incorporating conventional feed ingredients along with skim milk powder was provided to the nursing piglets from 10^{th} day of age up to weaning. The control group was not fed any probiotic supplementation.

Collection of blood samples

Blood samples for haematology were collected in vacutainers with anticoagulants (EDTA) from the anterior vena cava by using 5 ml disposable syringes from all pigs under

study on at 7th, 14th& 28th day of the experiment. The sample bottle was shaken gently to mix up the blood with the EDTA to prevent clotting. Blood samples of piglets were analysed for important blood haematological parameters like Haemoglobin, Packed Cell Volume (PCV), White blood cell (WBC) and Red blood cell (RBC) by automated blood analyzer.

Data was analysed statistically as per the methods described by Snedecor and Cochran

Results and Discussion

Haematological constituents reflect the physiological responsiveness of animal to its internal and external environment. The mean ± SE of haematological parameters namely Haemoglobin (Hb), White blood cell (WBC) and Red blood cell (RBC) and Packed Cell Volume (PCV) have been presented in the Table 1

The blood haemoglobin levels (g %) in pigs at day 7, 14 and 28 ranged from 11.14±0.63 to 12.71±1.08 in treatment group and 9.82±0.61 to 12.84±1.83 in Control group. However, the differences observed were not significant between the treatment and control group. The recorded haemoglobin levels were in the range reported in earlier studies(Copper CA*et al.*, 2014) (Kaneko*et al.*, 1997)(RAR, 2009). The differences observed in haemoglobin levels of pigs during different periods in the treatment groups were non-significant. Non-significant differences for Haemoglobin (Hb) were also reported by Dlamini *et al*., (2017) after oral supplementation of probiotic in weaning piglets.

Table.1 Mean (± SE) of biochemical parameters of LWY piglets under treatment and control groups

Parameters	Age (days)	Treatment -1 (T_1)	Control (C)	F Value
Haemoglobin (g%)	7	11.93±1.34	12.84±1.83	0.02^{NS}
	14	12.71±1.08	9.82±0.61	2.00^{NS}
	28	11.14±0.63	11.08±0.53	0.17^{NS}
WBC ($x10^3$ cells/µl)	7	13.78±1.45	12.33±2.12	2.26^{NS}
	14	$11.13±1.22^{b}$	$6.60±0.93^{a}$	3.04^{*}
	28	10.93±0.92	9.24±0.86	2.12^{NS}
RBC ($x10^6$ cells/µl)	7	6.45±0.52	6.12±0.83	0.22^{NS}
	14	5.42±0.31	4.92±0.30	0.71^{NS}
	28	5.84±0.31	5.22±0.44	0.63^{NS}
PCV (%)	7	51.90±4.55	50.11±6.42	0.12^{NS}
	14	42.91±2.29	38.59±2.61	0.63^{NS}
	28	43.53±1.23	38.18±3.62	1.44^{NS}

*Significant (P<0.05), and ^{NS} Non Significant, Note: Means bearing at least one common superscript in each row do not differ significantly

The WBC levels (x103 cells/µl) in pigs at day 7, 14, and 28 ranged from 10.93±0.92 to 13.78±1.45in treatment and 6.60±0.93to 12.33±2.12 in Control group. The blood WBC level of treatment and control groups resembled with the earlier report (RAR, 2009). At day 14 there was significantly (P<0.05) higher WBC in between T and C groups, which might be due to supplementation of Probiotic. Besides, in

weaned pigs higher WBC count after dietary supplementation of both probiotics (*Lactobacillus acidophilus* and *Pediococcus acidilactici*) was also reported in earlier studies in weaned pigs (Dowarah, 2018). The increase in the WBC values of probiotic supplemented group compared to control group came into agreement with earlier report made by Chen *et al.,* (2005).

The mean ± SE of RBC levels ($x10^6$ cells/µl) in pigs at day 7, 14, and 28 ranged from 5.42±0.31 to 10.93±0.92in treatment and 4.92±0.30 to 6.12±0.83 in Control group. Statistical analysis revealed non-significant differences in RBC levels between treatment and control groups which indicate that the nutritional supplement of neonatal piglet did not influence the RBC levels in pigs. Similar findings were reported by Dowarah *et al*.,(2018) that dietary supplementation of both probiotics (*Lactobacillus acidophilus* and *Pediococcus acidilactici*) causes higher concentration of the total Red blood cell (RBC) count ($P<0.05$) in weaned pigs (Dowarah, 2018). The increase in the RBC values of probiotic supplemented group compared to control group came into agreement with earlier report made by Chen *et al.,* (2005).

The mean ± SE of PCV levels (%) in pigs at day 7, 14, and 28 ranged from 42.91±2.29 to 51.90±4.55 in treatment and 38.18±3.62 to 50.11±6.42 in Control group. Statistical analysis revealed non-significant differences in PCV levels between treatment and control groups which indicate that the probiotic supplement of neonatal piglet did not influence the PCV levels in pigs. Similarly non-significant differences for PCV were reported by Dlamini *et al.,* (2015) in earlier studies who performed experiment on weaning pigs after supplementation of probiotic (Boudry *et al.,* 2007). The present finding was in agreement with the earlier reports (Etim *et al.,* 2014; RAR, 2009; Kumar *et al.,* 2015).

Hence, it can be concluded that dietary probiotic supplementation during neonatal period (birth to day 7) @ 1g/piglet twice daily didn't have adverse effect on haematological parameters of young pigs during pre-weaning period (birth to 28 days of age).

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