Haryana Vet. (October, 2022) **61(SI-2),** 88-91

Research Article

STUDY OF SOME BLOOD BIOCHEMICAL PARAMETERS OF ORPHAN PIGLETS REARED UNDER INTENSIVE SYSTEM

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Received: 22.10.2021; Accepted: 14.12.2021

ABSTRACT

Present study reports some biochemical parameters of orphan piglets under intensive system of rearing. A total of 34 Large White Yorkshire piglets were divided into two uniformed groups, *viz*. Control (C) and Treatment (T) groups. The piglets under T were artificially reared till day 42 of age. The piglets under C group were reared in weaner pens from day 28 till day 42 of age. Curd fortified with skim milk powder, vitamins (Groviplex @ 5ml/L), mineral mixtures (Minerex forte @ 5gm/L), dextrose (Glucose D powder @ 2gm/100ml), zinc oxide @ 0.2gm/100 ml and sugar @ 3gm/100 ml were fed ad libitum to piglets under T group upto 28 days of age. Pre-starter rations with 30 % skim milk powder were also provided to all experimental piglets from day 7 to 42 of age. Two ml blood was collected from the anterior venacava by humane puncture method on day 28 and 42 of age. Certain biochemical parameters *viz*. Glucose, Total serum Protein, Albumin, Globulin, Total Cholesterol and Triglyceride were determined by automated biochemical analyser (Dri-chem 4000i, Fujifilm) using standard kit. Overall blood biochemical profiles of LWY piglets did not show any significant differences between C & T groups at day 28 and 42 of age.

Keywords: Blood biochemical profile, Curd fortified with skim milk powder, Orphan piglets, Probiotics, Total Cholesterol

How to cite: Kayina, A.K., Kalita, G., Goswami, R., Talukdar, D.J., Das, H. and Hmar, L. (2022). Study of some blood biochemical parameters of orphan piglets reared under intensive system. *Haryana Vet.* **61(SI-2)**: 88-91.

Pig farming is an integral component of livelihood in North Eastern Region of India with 4.24 million pigs, which is around 46.85% of the total pig population of the country (20th Livestock Census, 2019). However, swine based entrepreneurs are facing several challenges in pig farming, such as, death of the sow soon after farrowing, sow agalactia, insufficient functional teats of the sow etc. Although, fostering is one of the easiest solution, but it is not always applicable in case of small and medium pig farming as this method is possible only when the other sow farrows at about the same time and only if she have an extra functional teats with good milk flow at the time of fostering. Nonetheless, practice of early weaning is one managemental tool that helps to improve the pig production efficiency. Early weaning also helps to minimize body weight loss of sow during lactation and also in early rebreeding of the sow leading to increased number of piglet production per sow per year (Whitmore and Green, 2001). Considering the above points, the present experiment was aimed for comparative evaluation of the health status of orphan piglets to that of the piglets raised by its own dam in terms of blood biochemical parameters on day 28 and 42 of age under intensive system of rearing.

MATERIALS AND METHODS

The present study was approved by the Institutional Animal Ethics Committee (IAEC) with approval reference number CVSC/CAU/IAEC/19-20/P-22. A total of 34 Large White Yorkshire piglets from 4 litters having minimum 8 piglets per litter were utilized for the study. Immediately after birth, all the piglets born alive in a litter were individually identified by putting ear knots with the help of needle and thread and thereafter, their body weights were recorded. The Probiotic (Darolac; Aristo Pharmaceuticals Pvt. Ltd. @ 1.25 x 109 live cells/piglets) and zinc oxide @ 2000 ppm were administered orally to all the experimental piglets for the first four days of age (i.e. day 0, 1, 2 and 3 of age) (Kalita *et al.*, 2021). Based on the body weights of day 4, piglets of one litter were subdivided into two equal groups, *viz*. Control (C) group and Treatment (T) group, so that each they have almost equal average body weight. After grouping on day 4, piglets under T groups were separated from their dam, and shifted to special weaner pen wherein proper environment temperature and hygiene were maintained. Piglets were artificially reared in weaner pen till day 42 of age. Remaining piglets under C group of the litter were with their dam (sow reared) till the day of weaning (day 28 of age) and thereafter reared in weaner pen from day 28 till day 42 of age so that effect of post weaning stress on health status of weaner pigs can be compared. Body weight of all the piglets (C and T groups) were taken every week in the morning hours before offering feed. Similarly, piglets of three more litters (having minimum of 8 piglets/litter) were utilized for the experiment, which gave a total of four replicates (i.e. R1, R2, R3 and R4) per group and minimum of 16 piglets per group (17 piglets in group C and 17 piglets in group T).

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Feed ingredients were procured from Guwahati and proximate principles analysis was done in the Department of Animal Nutrition, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram. Compounded feed for the experimental animals (sow and piglets) were prepared as per NRC, 1998 in the feed mill.

Piglets under T group were fed with curd fortified with skim milk (to make upto 20-25% total solid). Curd was fortified with skim milk powder (@ 80 g per 1000 ml of curd), vitamins (Groviplex; Virbac- @ 5ml/1000ml curd), mineral mixtures (Minerex forte; Excellar healthcare pvt. Ltd. @ 5g/1000ml curd), dextrose (Glucose D powder; Dabur India Ltd. @ 20g/1000ml curd), zinc oxide (@ 2g/1000 ml curd) and table sugar (@ 30g/1000 ml curd) (Roy *et al.*, 2020). Oral hand feeding of piglets was practiced under Group T for first few days of separation from dam, until piglets were accustomed to self-feeding. Frequency of liquid feeding (fortified curd) were gradually reduced from 1st to 4th weeks of age (5 times daily during 1st week, 4 times daily during 2nd week, 3 times daily during 3rd week and 2 times daily during 4th weeks of age). From day 7 of age onwards, dry matter percentage of liquid feed was increased with the addition of boiled pre-starter feed into the liquid feed. In addition to liquid feed, dry pre-starter feed (as per NRC 1998) with skim milk powder (30%) was also made available in a separate feeder from day 7 of age onward to the piglets. From the 5th week of age onwards, liquid feed (fortified curd) was totally withdrawn and piglets were fed only with pre-starter feed containing 30% skim milk powder. Skim milk powder and nutrient supplements (i.e. vitamins, minerals, zinc oxide etc.) were added in the pre-starter feed just prior to feeding.

Piglets reared with sow (group C) were provided with similar ration (pre-starter feed) containing skim milk powder (30%) from day 7 of age till the end of experiment i.e. day 42 of age. No liquid feeds (fortified curd) were provided to the piglets under control group at any time during the entire rearing period of experiment. Weaning of piglets under group C were done on day 28 of age and were reared in weaner pen till the end of experiment i.e. day 42 of age.

On day 28 and 42 of age, 2 ml of blood samples were withdrawn from the anterior vena cava by humane puncture method using 5 ml disposable sterile syringes into the clot activator sample vials. The blood was allowed to clot for 30 minutes and was centrifuged at 3000 rpm for 10 minutes in order to separate the serum from the clot. After the centrifugation, serum was collected and certain biochemical parameters *viz*. Glucose, Total serum Protein, Albumin, Globulin, Total Cholesterol and Triglyceride were determined by automated biochemical analyser (Drichem 4000i, Fujifilm) using standard kit. All the data were analysed statistically as per the methods described by Snedecor and Cochran (1995).

RESULTS AND DISCUSSION

The mean ± SE of Glucose (mg/dl) for LWY piglets on day 28 and 42 of age under control and treatment groups were 121.75±10.01 & 109.50±8.67 and 123.46±1.27 & 119.14±1.73 (table 1). Glucose for LWY piglets were non-significantly (P>0.05) higher in the control group as compared to treatment group at day 28 and day 42 of age respectively. Similar findings were also reported by Dlamini *et al.* (2017) on their study of effects of probiotics on growth performance in young piglets which were weaned at day 28 of age. However, Dowarah *et al.* (2018) recorded reduction in blood glucose level on supplementation of probiotics *P. acidilactici* FT28 and *L. acidophilus* in early weaned piglets. Whereas, Dhruw *et al.* (2015) documented higher glucose level in 28th day weaned piglets reared for 120 days on the study of supplementation of live *Lactobacillus acidophilus* NCDC 15 and curd into the basal diet. The mean ± SE of total serum protein (g/dl) for LWY piglets on day 28 and 42 of age under control and treatment groups were 5.90±0.34, 5.08±0.47 and 5.57±0.18, 5.22±0.26 (table 1). The total serum protein for LWY piglets revealed non-significant differences (P>0.05) between the control group and treatment group at day 28 and day 42 of age. Dlamini *et al.* (2017) also observed consistent findings of non-significant difference of total serum protein in 28th day old weaned piglets reared for 60 days. Dhruw *et al.* (2015) also reported non-significant difference in total serum protein where values remained within normal range. However, Bakr *et al.* (2009) found significantly increased total protein level in probiotic fed buffalo-calves. The mean ± SE of albumin (g/dl) for LWY piglets on day 28 and 42 of age under control and treatment groups were 3.93±0.31 & 3.00±0.37 and 3.41±0.12 & 3.55±0.08 (table 1). The albumin for LWY piglets at day 28 and day 42 of age were non-significantly (P>0.05) higher in the control group than the treatment group on day 28 and day 42 of age. The non-significant difference in albumin values between the control and treatment group might be indicated that age at weaning might not cause significant changes in albumin level in early weaned piglets. Similar findings of albumin (g/dl) levels in young piglets were reported by Kumar *et al.* (2012) and Dhruw *et al.* (2015). However, Busanello *et al.* (2015) and Dlamini *et al.* (2017) found higher concentration of albumin levels in young pigs than the

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

Parameters	Age (Days)	Control	Treatment	t- value
Glucose (mg/dl)	28	121.75±10.01	109.50±8.67	0.93
	42	123.46±1.27	119.14±1.73	2.02
Total serum protein (g/dl)	28	5.90±0.34	5.08±0.47	1.43
	42	5.57±0.18	5.22±0.26	1.11
Albumin (g/dl)	28	3.93±0.31	3.00±0.37	1.91
	42	3.41±0.12	3.55±0.08	0.98
Globulin (g/dl)	28	1.98±0.20	2.08±0.11	0.44
	42	3.25±0.13	3.45±0.06	1.38
Total cholesterol (mg/dl)	28	157.00±25.96	87.50±11.98	2.43
	42	123.73±1.35	98.54±1.08	1.52
Triglyceride (mg/dl)	28	79.75±22.29	89.50±31.94	0.25
	42	80.19±1.26	82.07±1.40	0.69

present results. The mean ± SE of serum globulin (g/dl) for LWY piglets on day 28 and 42 of age under control and treatment groups were 1.98±0.20 & 2.08±0.11 and 3.25±0.13 & 3.45±0.06 (Table 1). Statistical analysis of serum globulin level for piglets at day 28 and day 42 of age revealed non-significant differences (P>0.05) between the two groups. Bakr *et al.* (2009), Kumar *et al.* (2012) and Dhruw *et al.* (2015) also noticed similar non-significant difference in globulin in weaned piglets. However, Busanello *et al.* (2015) and Dlamini *et al.* (2017) documented higher concentration of globulin in young piglets suffering from infection and dehydration (control group) than that of normal healthy piglets (treatment group). The mean ± SE of cholesterol (mg/dl) for LWY piglets on day 28 and 42 of age under control and treatment groups were 157.00±25.96 & 87.50±11.98 and 123.73±1.35 & 98.54±1.08 (table 1). The total cholesterol for piglets at day 28 and day 42 of age were non-significantly (P>0.05) lower in the treatment group than the control group. Likewise, Dhruw *et al.* (2015) observed low cholesterol level in treatment (Lactobacillus acidophilus NCDC 15 and curd as probiotics) group compared to control group in early weaned piglets which was suggested that lower level of blood cholesterol indicates good health status and feed utilization of early weaned piglets. Kumar *et al.* (2012) also reported significantly decreased cholesterol level in early weaned cross bred (Landrace × Desi) piglets fed live culture of Saccharomyces cerevisiae. Dlamini *et al.* (2017) also noted similar findings of total cholesterol levels in young piglets in their study. The mean ± SE of triglyceride (mg/dl) for LWY piglets on day 28 and 42 of age under control and treatment groups were 79.75±22.29 & 89.50±31.94 and 80.19±1.26 & 82.07±1.40 (table 1). Triglyceride level for LWY piglets at day 28 and day 42 of age revealed non-significant differences (P>0.05) in triglyceride levels between the two groups. The present findings are compatible with Dhruw *et al.* (2015) which found similar triglyceride values between the treatment and control. However, Dowarah *et al.* (2018) reported lower level of serum triglyceride level than the present finding in young piglets.

CONCLUSIONS

The different blood biochemical parameters did not show any significant variations among the treatment and control groups in young LWY piglets on day 28 and 42 of age. Therefore, it could be concluded that LWY piglets under Intensive System of rearing didn't showed any major changes in blood biochemical profile which were found within the standard physiological range on day 28 and 42 of age. It may be recommended that orphan pigs can be effectively reared with feeds containing curd fortified with skim milk powder, vitamins, mineral mixtures, dextrose, zinc, sugar etc. with appropriate dose rate by following adequate hygienic practices.

ACKNOWLEDGEMENT

The authors would like to acknowledge the Dean, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, Selesih-796014, Aizawl, Mizoram, India for providing financial support for conducting the research work.

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