



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(7): 1293-1295
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www.thepharmajournal.com
Received: xx-05-2022
Accepted: xx-06-2022

Ranjit Rewar

Ph.D. Scholar, Department of Livestock Production Management, College of Veterinary and Animal Science, Bikaner, Rajasthan, India

Shweta Choudhary

Assistant Professor, Department of Livestock Production Management, Arawali Veterinary College, N.H. – 52 Jaipur Road, V.P.O. Bajor, Sikar, Rajasthan, India

Girin Kalita

Associate Professor and Head, Department of Livestock Production and Management, College of Veterinary Sciences and Animal Husbandry, CAU, Selesih, Aizawl, Mizoram, India

Shripal Siyak

Ph.D. Scholar, Department of Livestock Production Management, College of Veterinary and Animal Science, Bikaner, Rajasthan, India

Manoj Kumar Dhaka

Ph.D. Scholar, Department of Veterinary Clinical Medicine, College of Veterinary and Animal Science, Bikaner, Rajasthan, India

AK Jhirwal

Assistant Professor, Department of Livestock Production Management, College of Veterinary and Animal Science, Bikaner, Rajasthan, India

Surendra

Assistant Professor, Department of Veterinary Public Health and Epidemiology, Arawali Veterinary College, N.H. – 52 Jaipur Road, V.P.O. Bajor, Sikar, Rajasthan, India

Vikas Choudhary

Veterinary Officer, Veterinary Hospital (Govt. of Rajasthan), Palasara, Sikar, Rajasthan, India

Corresponding Author

Ranjit Rewar

Ph.D. Scholar, Department of Livestock Production Management, College of Veterinary and Animal Science, Bikaner, Rajasthan, India

Effect of feeding Fermented Liquid Feed (FLF) on Average Body Weight (ABW) and Average Daily Gain (ADG) in pre-weaned and post-weaned Young Pigs of Large White Yorkshire (LWY) breed

Ranjit Rewar, Shweta Choudhary, Girin Kalita, Shripal Siyak, Manoj Kumar Dhaka, AK Jhirwal, Surendra and Vikas Choudhary

Abstract

In the present study, it was found that the ABW (kg) of young pigs on the day 70 in groups C, T1, and T2 were 15.32±0.41, 16.13±0.17, and 15.90±0.17, respectively. Statistically, a highly significant ($P < 0.01$) increased ABW of pigs under T1 on days 42 and 49 when compared to pigs reared under groups C and T2. These results were showing good growth performance in young pigs fed with FLF. ADG (g) in the pre-weaning piglets were 174.27±4.80, 167.83±4.39, and 155.55±4.75, respectively, while the post-weaning ADG were 214.66±8.03, 233.94±20.39, and 235.89±2.82 for groups C, T1, and T2, respectively. The overall ADG during pre and post-weaning periods were 198.50±6.17, 207.13±1.75, and 203.75±2.22 for groups C, T1, and T2, respectively. Statistical analysis revealed a significant ($P < 0.05$) increased in ADG on 2nd and 8th weeks under control, and 5th, 6th, and 10th weeks under T1. Statistically, no significant difference in overall ADG among different groups but ADG was found good in young pigs fed with FLF as compared to dry feed and a combination of dry feed and FLF.

Keywords: Fermented liquid feed, average body weight, average daily gain, young pigs and large white Yorkshire

1. Introduction

Pig farming is a important enterprise for sustainable economic support to small farmers of a developing country. In India this sector of livestock provides financial aid to poor and marginal section of the community, especially to tribal masses and people of North-East India of the country. Swine, in comparison with other livestock species, generate faster economic returns to the farmers with its high feed conversion ratio, shorter generation interval, more litter size, better and faster growth on lower inputs. Despite its potential, the swine industry is in its nascent stage of development in India. As per 20th Livestock Census, there are 9.06 million pigs out of which 1.90 million belongs to exotic/crossbred and 7.16 million belongs indigenous/non-descript pigs. Rate of growth and survival among piglets during pre weaning and post weaning is an important challenge worldwide and is still unaddressed. Shifting of diet of piglets from milk to dry feed is a stressful event which leads to reduced body weight gain and enhanced mortality (Moeser *et al.*, 2007) [6]. Although weaning of piglets at early found beneficial, the weaning lead to reduction in the nutrient intake (energy) in post-weaned piglets (Brooks *et al.*, 2001) [2]. To enhance the nutrient intake various antibiotics are used worldwide but these lead to emergence of antibiotic resistance. Russell *et al.* (1996) [9] found that Fermented Liquid Feed (FLF) may act as an alternative to antibiotic. It was reported that FLF increases feed utilization, digestibility and highly efficient to enhance the growth performance of the piglets (Kim *et al.*, 2001) [3]. FLF provides feed and water at the same time (Brooks and Tsourgiannis, 2003) [1]. In India, no such study was done previously indicating the influence of FLF on the growth performance of young piglets. Keeping the above facts in mind, this investigation was conducted to study the effect of FLF on the young pigs during pre weaning and post weaning periods on growth performance.

2. Materials and methods

2.1 Experimental design of the study

This study was conducted out at Instructional Livestock Farm, Department of Livestock

Production and Management, College of veterinary Sciences and Animal Husbandry, CAU, Selesih, Aizawl, Mizoram. The young pigs of large white Yorkshire breed were divided into three groups namely control, treatment 1 and treatment 2.

Further each group has four replicates and each replicate has ten young pigs. A total of 120 young pigs were considered in this study.

Table 1: The detailed experimental design.

S. N	Parameters	Control				Treatment 1				Treatment 2			
1	Number of young pigs	4 Litters				4 Litters				4 Litters			
2	Replicates (1 litter per replicate)	CR ₁	CR ₂	CR ₃	CR ₄	T ₁ R ₁	T ₁ R ₂	T ₁ R ₃	T ₁ R ₄	T ₂ R ₁	T ₂ R ₂	T ₂ R ₃	T ₂ R ₄
3	Type of Feed	Dry feed				FLF				Dry Feed +FLF			
4	Feeding Period	From day 7 to day 70				From day 7 to day 70				From day 7 to day 70			
5	Weaning Age (day)	28				28				28			
6	Feeding Schedule	Pre-starter – 2 to 3 wks Starter – 4 to 6 wks Grower – 7 to 10 wks				Pre-starter – 2 to 3 wks Starter – 4 to 6 wks Grower – 7 to 10 wks				Pre-starter – 2 to 3 wks Starter – 4 to 6 wks Grower – 7 to 10 wks			

2.2 Preparation of fermented liquid feed

Fermented liquid feed was prepared at the pig farm of Livestock Farm Complex, College of Veterinary Sciences and Animal Husbandry. Feeds for fermentation were prepared by mixing main ingredients like maize, soybean, ground nut cake and wheat bran as per required rations. Feed constituents like, mineral mixture, lysine, methionine, soybean oil and salt were added in the fermented feed just before feeding to the animals. The feed and water in the ratio of 1:1.5 was mixed to prepare the fermented liquid feed and then *Lactobacillus acidophilus* was added at concentration of 10⁶ to 10⁷ CFU/ml of liquid feed. For proper fermentation, liquid feed was kept under airtight condition in containers and by using room heater, required temperature of 20-25° C inside the room was tried to maintain. The FLF pH was regularly checked by using pH meter. Once desired pH of 3.5-4.5 in the FLF was achieved, half of the FLF were used for feeding and other half were used as inoculum for fermentation of next batch of feed. For continuous production of FLF required for the experiment, “Back slopping” procedure as explained by Salovaara (1998)^[10] was adopted.

2.3 Management of young pigs

The young pigs were reared in farrowing pens and weaner pens which was made up of polypropylene plastic slatted floor, during pre and post-weaning periods, respectively. Farrowing pens were fitted with farrowing crate to prevent the death of piglets due to crushing. To maintain the required temperature for the young pigs the brooding facilities were provided in farrowing pens as well as in the weaner pens. The arrangement for clean and fresh drinking water was provided round the clock through nipple drinkers. The feed was provided twice daily at 9:00 AM in the morning and at 4:00 PM in the evening and were fed up to their appetite as per NRC standards (1998). The amount of feed given was weighted before it was given to piglets and proper record of feeding was maintained. Pre-starter feed were provided to the young pigs during 2-3 weeks of age, starter feed during 4-6 weeks of age and then grower feed during 7-10 weeks of age.

2.4 Parameters Recorded

2.4.1 Body weight in kilogram (kg)

The body weight of young pigs was measured weekly from day 0 to day 70 every morning just before feeding by using digital weighing balance.

2.4.2 Average daily gain (ADG) in gram (g)

ADG of the young pigs was calculated by subtracting the

initial body weight from the final body weight of a particular period by using the following formula:

$$ADG = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{Age reared (days)}} \times 1000 \text{ g}$$

2.5 Statistical analysis

The data collected from the study were subjected to statistical analysis using IBM SPSS version-16 software for meaningful and accurate comparison and interpretation (Snedecor and Cochran, 2004)^[11].

3. Results and discussion

3.1 Average body weight (ABW)

The mean (\pm SE) ABW (kg) of young pigs from birth (0 Day) to 70 days is depicted in table. The ABW (kg) of young pigs on day 70 in the present study in groups C, T1, and T2 were 15.32 \pm 0.41, 16.13 \pm 0.17, and 15.90 \pm 0.17, respectively. Statistical analysis revealed highly significant ($P < 0.01$) increased ABW of pigs under T1 on days 42 and 49 when compared to pigs reared under groups C and T2. Present findings of ADW of young LWY were comparable with the reports of Lawlor *et al.* (2002)^[4] and Pedersen *et al.* (2004)^[8]. However, Missotten *et al.* (2010)^[5] reported that those piglets fed on FLF had higher body weight gain than those fed on both dry feed and the combination of dry and FLF. Similarly, Xu *et al.* (2020)^[12] reported that the young weaned pigs fed on fermented feed gained more (20.869 g/day) than young pigs fed on a basal dry diet.

Table 2: Average body weight (kilogram) of LWY young pigs under control and treatment groups (Mean \pm SE)

Age (Days)	Control (C)	Treatment-1 (T1)	Treatment-2 (T2)	F-value
0	1.51 \pm 0.08	1.59 \pm 0.06	1.61 \pm 0.05	0.60 ^{NS}
7	2.41 \pm 0.12	2.54 \pm 0.10	2.52 \pm 0.08	0.40 ^{NS}
14	3.84 \pm 0.11	3.76 \pm 0.10	3.63 \pm 0.08	1.13 ^{NS}
21	5.16 \pm 0.13	5.03 \pm 0.13	4.74 \pm 0.10	2.95 ^{NS}
28	6.27 \pm 0.14	6.30 \pm 0.14	5.96 \pm 0.15	1.62 ^{NS}
35	7.06 \pm 0.14	7.52 \pm 0.17	7.13 \pm 0.15	2.50 ^{NS}
42	7.88 \pm 0.18 ^a	9.02 \pm 0.18 ^b	8.54 \pm 0.16 ^b	10.19 ^{**}
49	9.63 \pm 0.23 ^a	10.57 \pm 0.19 ^b	10.08 \pm 0.16 ^{ab}	5.56 ^{**}
56	11.40 \pm 0.29	12.09 \pm 0.20	11.85 \pm 0.17	2.36 ^{NS}
63	13.35 \pm 0.35	13.80 \pm 0.19	13.69 \pm 0.17	0.82 ^{NS}
70	15.32 \pm 0.41	16.13 \pm 0.17	15.90 \pm 0.17	2.32 ^{NS}

** $P < 0.01$; ^{NS} Non-significant; each row having common superscript do not have significant difference

3.2 Average daily gain (ADG)

The mean (\pm SE) ADG (g) of LWY young pigs from 1st to 10th weeks and pre-weaning, post-weaning, and overall ADG (g) are depicted in table. The pre-weaning ADG (g) were 174.27 \pm 4.80, 167.83 \pm 4.39, and 155.55 \pm 4.75 respectively, while the post-weaning ADG were 214.66 \pm 8.03, 233.94 \pm 20.39, and 235.89 \pm 2.82 for groups C, T1, and T2 respectively. The overall ADG during pre and post-weaning periods were 198.50 \pm 6.17, 207.13 \pm 1.75, and 203.75 \pm 2.22 for groups C, T1, and T2 respectively. Statistically, a significant

($P < 0.05$) increased in ADG on 2nd and 8th weeks under control, and 5th, 6th, and 10th weeks under T1. Present findings of ADG of young LWY were comparable with the reports of Lawlor *et al.* (2002) [4] and Pedersen *et al.* (2004) [8]. However, Missotten *et al.* (2010) [5] reported that those piglets fed on FLF had higher body weight gain than those fed on both dry feed and the combination of dry and FLF. Similarly, Xu *et al.* (2020) [12] reported that the young weaned pigs fed on fermented feed gained more (20.869 g/day) than young pigs fed on a basal dry diet.

Table 3: Average daily gain (gram) of LWY young pigs under control and treatment groups (Mean \pm SE)

Age (Week)	Control (C)	Treatment-1 (T1)	Treatment-2 (T2)	F-value
1 st	136.36 \pm 11.39	133.85 \pm 8.39	125.45 \pm 7.65	0.396 ^{NS}
2 nd	204.50 \pm 16.12 ^b	174.46 \pm 8.06 ^{ab}	157.70 \pm 8.30 ^a	4.489*
3 rd	190.51 \pm 13.62	182.50 \pm 7.62	160.15 \pm 8.64	2.486 ^{NS}
4 th	165.71 \pm 8.49	180.53 \pm 8.57	177.10 \pm 8.77	0.766 ^{NS}
5 th	104.19 \pm 9.35 ^a	176.06 \pm 7.77 ^b	162.74 \pm 7.40 ^b	21.113**
6 th	125.15 \pm 9.53 ^a	211.06 \pm 9.63 ^b	201.50 \pm 5.89 ^b	30.379**
7 th	248.44 \pm 13.02	222.20 \pm 7.94	220.56 \pm 6.68	2.717 ^{NS}
8 th	252.59 \pm 15.44 ^b	216.53 \pm 8.04 ^a	252.36 \pm 5.76 ^b	4.155*
9 th	279.17 \pm 14.44	244.08 \pm 9.06	262.21 \pm 6.36	2.878 ^{NS}
10 th	281.64 \pm 16.37 ^a	333.06 \pm 13.21 ^b	315.97 \pm 6.28 ^{ab}	4.378*
Pre-weaning (1 st - 4 th weeks)	174.27 \pm 4.80 ^b	167.83 \pm 4.39 ^{ab}	155.55 \pm 4.75 ^a	4.084*
Post-weaning (5 th - 10 th weeks)	214.66 \pm 8.03 ^a	233.94 \pm 3.27 ^b	235.89 \pm 2.82 ^b	5.273**
Overall	198.50 \pm 6.17	207.13 \pm 1.75	203.75 \pm 2.22	1.296 ^{NS}

** $P < 0.01$; * $P < 0.05$; ^{NS} Non-significant; * $P < 0.01$; * $P < 0.05$; ^{NS} Non-significant; each row having common superscript do not have significant difference

4. Conclusion

Data of ADW and ADG just after post-weaning period (week 5-6) revealed that fermented feed (T1 and T2-group) significantly helped to check the reduction in growth rate in young pigs as compared to piglets fed on the dry diet (C-group). However, the sudden death of few piglets during weeks 6 and 7 under the T1 and T2 group might have resulted in non-significant differences in overall ADW and ADG.

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