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Effect of feeding fermented liquid feed (FLF) on average daily feed intake (ADFI) and feed conversion ratio (FCR) in Pre-weaned and Post-weaned young pigs of large white Yorkshire (LWY) breed

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Abstract
The findings of pre-weaning ADFI (g) were 95.99 ± 7.41, 117.64 ± 7.34, and 111.77 ± 4.63, respectively, while the post-weaning ADFI were 510.55 ± 42.50, 521.38 ± 23.78, and 625.51 ± 51.37 for groups C, T1, and T2 respectively. The overall ADFI during both pre and post-weaning periods were 326.30 ± 25.79, 341.94 ± 14.92, and 397.18 ± 27.94 for groups C, T1, and T2, respectively. Statistically, a significant (<0.05) increase in ADFI on the 2nd week under T2 (<0.05), 4th under T1 (<0.05), and 6th under T2 (<0.01). Statistically, no significant difference was present in overall ADFI. The ADFI was good in piglets fed with a combination of dry feed and FLF. The mean (± SE) FCR of young pigs in C, T1, and T2 on the 10th week of age were 2.43 ± 0.33, 2.07 ± 0.17, and 2.27 ± 0.19 respectively. The overall post-weaning FCR were 2.55 ± 0.19, 2.14 ± 0.10, and 2.42 ± 0.16 for groups C, T1, and T2, respectively. Except for the 5th and 6th week, non-significant (P>0.05) differences in FCR was observed in the three groups during the post-weaning period. The FCR was better in the young pigs fed with FLF (2.14 ± 0.10) followed by the combination of dry and FLF (2.42 ± 0.16) and then dry feed (2.55 ± 0.19).

Keywords: Fermented, feed, FLF, FCR, ADFI, LWY

1. Introduction
Livestock is the major source of round the year income to rural masses. Due to stagnation in poultry industry and dairy sectors, there is huge potential for piggery sector to grow in near future in India. Pig farming provides sustainability to marginal sections of society, especially to tribal masses of North-East part of India. As per 20th Livestock Census, there are 9.06 million pigs out of which 1.90 million belongs to exotic/cossbred and 7.16 million belongs indigenous/non-descript pigs. The growth and survivor rate of piglets during the initial phase of life and during post weaning are very serious issues, worldwide. The diet of young piglets are shifted from milk to dry feed from day 8 to day 28 of their life. The young pigs during weaning period under go through stressful events. It is desirable that weaner pigs should adapt to new physical and social environment, and diet change (Moeser *et al*., 2007) [7]. Low feed consumption during weaning period cause reduced gain in body weight and various GIT problems particularly diarrhoea that lead to increased rate of morbidity and mortality (Pluske *et al*., 1997; Moeser *et al*., 2007) [10, 7]. Weaning of piglets at early stage is beneficial in many parameters but it leads to reduced nutrient intake (energy) in post-weaned piglets (Brooks *et al*., 2001) [2]. To tackle this reduction many growth promoters including antibiotics are used in feed but these leads to development of anti-microbial resistance. Russell *et al*. (1996) [11] 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) [5]. 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, therefore this study was conducted to study the effect of FLF on the young pigs during pre-weaning and post weaning periods on average daily feed intake and feed conversion ratio.

2. Materials and Methods

2.1. Experimental design of the study

This study was centered 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_1R_1	T_1R_2	T_1R_3	T_1R_4	T_2R_1	T_2R_2	T_2R_3	T_2R_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 were 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, and 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 20-25º 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) [12] 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

The parameters recorded during this study period were given below:

2.4.1. Average daily feed intake (ADFI) in gram (g)

The *ad libitum* type of feeding was provided to the young pigs during study period from day 0 to day 70. The ADFI was calculated by subtracting the residual feed from the feed provided, after making corrections for dry matter content of the feed. The young pigs were provided with *ad libitum* rations from 7 days till 70 days of age. Daily feed offered in the morning and evening as well as residual feed left in the following morning were recorded.

2.4.2 Feed conversion ratio (FCR)

FCR of the young pigs was calculated when feed consumed (kg) was divided by body weight gain (kg) during the same period of time by using the formula:

$$\text{FCR} = \frac{\text{Feed consumed (kg)}}{\text{Body weight gain (kg)}}$$

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) [13]

3. Results and discussion

3.1. Average daily feed intake (ADFI)

The pre-weaning ADFI (g) were 95.99 ± 7.41, 117.64 ± 7.34, and 111.77 ± 4.63 respectively, while the post-weaning ADFI were 510.55 ± 42.50, 521.38 ± 23.78, and 625.51 ± 51.37 for groups C, T1, and T2 respectively. The overall ADFI during both pre and post-weaning periods were 326.30 ± 25.79, 341.94 ± 14.92, and 397.18 ± 27.94 for groups C, T1, and T2 respectively. Statistical analysis revealed a significant (<0.05) increase in ADFI on the 2nd week under T2 (<0.05), 4th under T1 (<0.05), and 6th under T2 (<0.01). The data of ADFI during different periods under study were comparable with the reports of Xu *et al.* (2020) [14]. However, Missotten *et al.* (2010) [6] reported higher and Canibe and Jensen (2003) [4] reported lower ADFI in comparison to the present study.

Table 2: Average daily feed intake (gram) of LWY young pigs under control and treatment groups (Mean ± SE)

Age (Week)	Control (C)	Treatment-1 (T1)	Treatment-2 (T2)	F-value
2nd	4.25 ± 0.43a	6.80 ± 0.98b	7.33 ± 0.50b	5.841*
3rd	33.22 ± 4.91	44.29 ± 3.81	37.67 ± 1.53	2.277NS
4th	74.79 ± 3.09ab	88.14 ± 3.45b	67.31 ± 5.69a	6.207*
5th	271.69 ± 26.43	331.33 ± 25.57	334.78 ± 17.73	2.264NS
6th	309.11 ± 36.09a	414.75 ± 20.08b	519.75 ± 30.18c	12.720**
7th	475.70 ± 51.83	442.87 ± 23.02	587.80 ± 45.16	3.296NS
8th	539.03 ± 50.74	493.00 ± 30.50	610.50 ± 49.14	1.777NS
9th	588.83 ± 57.89	562.22 ± 27.08	691.79 ± 77.29	1.397NS
10th	640.08 ± 54.94	694.07 ± 26.92	717.69 ± 69.38	.555NS
Pre-weaning (1st - 4th weeks)	95.99 ± 7.41	117.64 ± 7.34	111.77 ± 4.63	2.891NS
Post-weaning (5th - 10th weeks)	510.55 ± 42.50	521.38 ± 23.78	625.51 ± 51.37	2.412NS
Overall	326.30 ± 25.79	341.94 ± 14.92	397.18 ± 27.94	2.493NS

**<0.01; *<0.05; NS Non-significant; *<0.01; *<0.05; NS Non-significant; each row having common superscript do not have significant difference

3.2. Feed Conversion ratio (FCR)

The mean (± SE) FCR of young pigs in C, T1, and T2 on the 10th week of age were 2.43 ± 0.33, 2.07 ± 0.17, and 2.27 ± 0.19 respectively. The overall post-weaning FCR were 2.55 ± 0.19, 2.14 ± 0.10, and 2.42 ± 0.16 for groups C, T1, and T2 respectively. With the exception of the 5th and 6th week, non-significant (P>0.05) differences in FCR among the three groups were observed during the post weaning period. However, from the present data, it is revealed that the FCR of young pigs was better in the post-weaning period (week 5th to 6th) fed fermented feed (T1) or fed a combination of dry and fermented feed (T2) as compared to pigs fed dry feed. The data of FCR during different periods under study were comparable with the reports of Bunte *et al.* (2020) [3]. However, Missotten *et al.* (2010) [6] reported higher and Canbie and Jensen (2003) [4] reported lower FCR in comparison to the present study

Table 3: Feed conversion ratio of LWY young pigs under control and treatment groups (Mean ± SE)

Age (Week)	Control (C)	Treatment-1 (T1)	Treatment-2 (T2)	F-value
5th	2.63 ± 0.23b	2.00 ± 0.15a	2.00 ± 0.08a	4.929*
6th	3.85 ± 0.44b	2.07 ± 0.11a	2.40 ± 0.18a	11.328**
7th	2.25 ± 0.43	2.06 ± 0.09	2.74 ± 0.20	1.56NS
8th	1.98 ± 0.12	2.28 ± 0.19	2.51 ± 0.16	2.817NS
9th	2.16 ± 0.14	2.37 ± 0.18	2.63 ± 0.27	1.322NS
10th	2.43 ± 0.33	2.07 ± 0.17	2.27 ± 0.19	0.566NS
Overall (5th – 10th weeks)	2.55 ± 0.19	2.14 ± 0.10	2.42 ± 0.16	1.816NS

**<0.01; *<0.05; NS Non-significant; *<0.01; *<0.05; NS Non-significant; each row having common superscript do not have significant difference

4. Conclusion

From this study, it can be inferred from statistical analysis of data that FLF does not affect ADFI and FCR. However, numerically better FCR for T1 groups might be due to a reduced incidence of diarrhoea in pigs, which in turn might have improved the feed efficiency. Another observation made during the present study that, when given choice (under T2), pigs prefer to consume dry feed as compared to FLF. The lower intake of FLF may be attributed to the acidic pH of FLF. Although acidic pH of FLF prevents the growth of *Enterobacteriaceae*, low pH increases the chance of yeast proliferation in the feed, which in turn might have reduced the feed intake (Plumed-Ferrer and Von Wright, 2009) [9] in the present study.

5. References

1. Brooks PH, Tsourgiannis CA. Factors affecting the voluntary feed intake of the weaned pig. Weaning the Pig, Concepts and Consequences. Wageningen, The Netherlands: Wageningen Academic Publishers, 2003, 81-116.
2. Brooks PH, Beal JD, Niven S. Liquid feeding of pigs: potential for reducing environmental impact and for improving productivity and food safety. Rec. Adv. Anim. Nutr. 2001;13:49-63.
3. Bunte S, Grone R, Keller B, Keller C, Galvez E, Strowig T, *et al*. Intestinal Microbiota of Fattening Pigs Offered Non-Fermented and Fermented Liquid Feed with and without the Supplementation of Non-Fermented Coarse Cereals. Microorganisms. 2020;8(5):638.
4. Canibe N, Jensen BB. Fermented and non-fermented liquid feed to growing pigs: effect on aspects of gastrointestinal ecology and growth performance. J Ani. Sci. 2003;81(8):2019-2031.
5. Kim JH, Heo KN, Odle J, Han IK, Harrell RJ. Liquid diets accelerate the growth of early weaned pigs and effects are maintained to market weight. J Anim. Sci. 2001;79:427-434.
6. Missotten JAM, Michiels J, Ovyn A, De Smet S, Dierick NA. Fermented liquid feed for pigs. Arch. Anim. Nutr. 2010;64:437-66.
7. Moeser AJ, Klok CV, Ryan KA, Wooten JG, Little D, Cook VL, *et al*. Stress signaling pathways activated by weaning mediate intestinal dysfunction in the pig. Am. J Physiol. Gastrointest. Liver Physiol. 2007;292(1):173-181.
8. NRC. Nutr. Requir. Swine. 10th revised edition, subcommittee on Animal Nutrition, Board of Agriculture, NRC, National Academy pres-2101 Constitute Avenue, NW-Washington, DC 20418, USA, 1998.
9. Plumed-Ferrer C, Von Wright A. Fermented pig liquid feed: nutritional, safety and regulatory aspects. J Appl.

Microbiol. 2009;106:351-68.
10. Pluske JR, Hampson DJ, Williams IH. Factors influencing the structure and function of the small intestine in the weaned pig: a review. Livest. Prod. Sci. 1997;51(1-3):215-236.
11. Russell PJ, Geary TM, Brooks PH, Campbell A. Performance, water use and effluent output of weaner pigs fed ad libitum with either dry pellets or liquid feed and the role of microbial activity in the liquid feed. J Sci. Food Agr. 1996;72(1):8-16.
12. Salovaara H. Lactic acid bacteria: Microbiology and functional aspects. In: Salminen S, Von Wright A, editors. Lactic acid bacteria in cereal-based products. 2nd edn., New York, US: Marcel Dekker, 1998, 115-137.
13. Snedecor GW, Cochran WG. Statistical Methods, 1st East-West Press edition, affiliated East-West Private Ltd. New Delhi, 2004.
14. Xu B, Li Z, Wang C, Fu J, Zhang Y, Wang Y, *et al*. Effects of fermented feed supplementation on pig growth performance: A meta-analysis. Anim. Feed Sci. Tech. 2020;259:114315.