



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(1): 235-239

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Received: 18-11-2017

Accepted: 22-12-2017

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## Effect of early weaning on mortality, incidence of diseases and haemato-biochemical parameters of large white Yorkshire pigs

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**Abstract**

The study was carried out at the Instructional Livestock Farm Complex, College of Veterinary Science & Animal Husbandry by selecting 18 lactating Large White Yorkshire (LWY) sows along with their litter with the objective to study the effect of early weaning of piglets on their health. All the 18 sows along with their piglets were divided into three groups (T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub>); in a manner that each group has represented by almost similar litter size at birth and of similar parity sows. Weaning of piglets was done for T<sub>1</sub> and T<sub>3</sub> groups at day 24 and day 28 of lactation respectively. Split weaning was followed for the piglets under group T<sub>2</sub> wherein heavier half of the litters were weaned at day 24 and the remaining half were weaned at day 28 of lactation. Incidence of diarrhea, mortality rate etc. were recorded on a regular basis. Blood samples of piglets were analyzed for T<sub>1</sub> group at day 24 (just before weaning), 28, 35, 42 and 70 and for T<sub>3</sub> groups at day 28 (just before weaning), 35, 42 and 70 and important blood parameters like, Glucose, Haemoglobin, Serum Albumin, Serum total protein, AST, ALT and BUN were estimated. The overall mortality rate in the whole experimental period was 14.55%, with pre and post weaning mortality of 6.06 % and 9.03% respectively. The overall incidences of diarrhoea from birth to 10<sup>th</sup> week of age were not significant among the different weaning groups. The haemato-biochemical parameters were in normal range in both T<sub>1</sub> and T<sub>3</sub> weaning groups.

**Keywords:** Early weaning, Large White Yorkshire, Haemato-biochemical parameters

**1. Introduction**

Early weaning is a manage mental tool which helps to improve the pig productivity. On the other hand piglets immune and digestive systems are quite immature at that age (3 to 4 weeks), needs to be maintained under healthy conditions and feed should be made up of easily digestible ingredients containing more dairy products [18]. With the advancement of feed science and health management, it is now possible to wean piglets at an early day (14 to 18 days). On the other hand, piglets have very high potential of growth during the early age of their life [18]. Whereas, from nutrient supplied and requirement point of view, the gap between supply and demand of nutrients started as early as 8th day of life [18] in piglets and this gap further widen, when sow milk production started to decline from 3rd and 4th week of age. On the other hand, when piglets are with the mother, solid feed consumptions are reduced compared to their weaned counterparts. Therefore, early weaning of piglets and managing them in high health condition with quality feed and housing may provide the opportunity to exploit higher growth potential of young piglets which is presently exploited only up to 50% under standard farming condition [18].

Many diseases are transmitted to the suckling piglets from the sow when they are in farrowing pen, where in maintaining high sanitation is difficult to achieve. Early weaning of piglets and managing them in high health status with suitable housing may also be an another strategy to reduce the pre-weaning mortality of piglets, which even touches up to 35% especially under Indian farming condition [2]. However, On the ground of piglet biology weaning between 28 and 42 days optimum as their digestive enzyme activity increases after 4 weeks of age [26]. Early weaning before 28 days may have some effect on health status of the piglets. Therefore, this study aimed to observe the effect of early weaning on the health condition of the early weaned piglets.

## 2. Materials and Methods

### 2.1 Location and period of the study

The study was carried out at the Instructional Livestock Farm Complex, College of Veterinary Science & Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram, India during the year 2016-17. The study was conducted for seven months from October 2016 to April 2017.

### 2.2 Experimental animals and design

A total of 18 lactating sows (Large White Yorkshire) along with their litter having minimum of 7 piglets were selected for the study. Sows used for the study were taken from the College Pig Farm and from the Pig unit maintained under the Department of Biotechnology funded research project entitled “*Techno-Economic Empowerment of Rural Women through Sustainable Piglet Production Units in Aizawl District of Mizoram*”. All the 18 sows along with their piglets were divided into three groups (T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub>); in a manner that each group has represented by almost similar litter size at birth and of similar parity sows. To randomize sire effect, litters belonging to same sire were distributed in all the three groups. Weaning of piglets was done for T<sub>1</sub> and T<sub>3</sub> groups at day 24 and day 28 respectively. Split weaning was followed for the piglets under group T<sub>2</sub>, where in heavier half of the litters were weaned at day 24 and remaining half were weaned at day 28 of lactation. All the piglets were reared up to day 70 (10 weeks) of age.

### 2.3 Housing

After weaning, piglets were shifted to weaner pen wherein temperature of the weaner pen was maintained with suitable heating device. Piglets of one litter were maintained together from weaning till the end of the experiment period.

### 2.4 Feeding

Balanced rations were prepared for different categories pigs under the study as per NRC, 1998 standard, incorporating conventional feed ingredients and skim milk powder, sugar, soybean oil, molasses, feed additives etc. Piglets irrespective of groups were provided *ad libitum* pre-starter (2<sup>nd</sup> to 5<sup>th</sup> week), starter (6<sup>th</sup> to 7<sup>th</sup> week) and grower feed (8<sup>th</sup> to 10<sup>th</sup> week).

### 2.5 Health management

Deworming was carried out in pigs on 2<sup>nd</sup> week after weaning. Whenever diarrhoea was observed, *Diardon bolus*- {Metronidazole & Furazolidone (VetsFarma Ltd.)} was given orally by mixing with feeds. In uncured pigs, higher group of antibiotics *Flobac SA*- {Enrofloxacin (Intaspharma.)} was injected.

### 2.6 Parameters recorded

#### 2.6.1 Rate of incidence of diseases, mortality and survivability of the weaned pigs

The rate of incidence of diseases, mortality and survivability of the weaned pigs were recorded from birth to 10<sup>th</sup> week of age.

#### 2.6.2 Haemato-biochemical parameters of the weaned piglets

To study haemato-biochemical parameters like Glucose, Haemoglobin, Serum Albumin, Serum total protein, AST-Aspartate transaminase, ALT-Alanine transaminase and Blood Urea Nitrogen (BUN) of weaned piglets, blood

samples were collected from anterior vena cava by using disposable syringes randomly from one piglet/litter. Blood sample collections for T<sub>1</sub> groups were done at day 24 (just before weaning), 28, 35, 42 and 70 and for T<sub>3</sub> groups were done at day 28 (just before weaning), 35, 42 and 70. Haemoglobin was estimated by using automated blood analyzer (Melet Schloesing Lab., MS4e model) and other biochemical parameters were estimated by using fully automated Dry clinical analyzer (FujFilm 4000i) from separated serum.

### 3. Statistical analysis

The data collected from the study were subjected to statistical analysis using IBM SPSS version-20 software for meaningful and accurate comparison and interpretation.

## 4. Results and Discussion

### 4.1 Mortality and Survivability of piglets

Out of the 165 LWY piglets born alive, 24 piglets were died during the experiment period (from birth to 10 weeks) with mortality rate (%) of 14.55; out of which overall pre weaning mortality was 6.06 % and post weaning mortality was 9.03%. The pre weaning mortality of the present study was lower and the post weaning mortality of the present study was higher than reported by previous workers [1, 9, 13, 14, 16, 23, 25, 27].

In the present study, higher mortality rates in piglets was recorded in first week (33.33%) which is in agreement with the findings of previous workers [7, 9, 10, 11, 28]. Piglets with low birth weight succumbed to death and it might be the reason of high mortality in first or second week of age. Piglets with lower birth weight is particularly at a risk for pre-weaning morbidity and mortality and also, piglets weighing less than 0.80 kg at birth had a 32.00 per cent survival rate, compared with 97.00 per cent for piglets weighing 2.00 kg or more [15].

Among the total mortality, 29.17% died in Gastroenteritis, 20.83% died in Pneumonia + Gastroenteritis, 4.17% died in Crushing by mother, 8.33% died in Iron toxicity, 29.17% died in Pneumonia, 8.33 % in other causes. This reports correlate with the findings of previous worker [8, 11, 21, 28].

In the present study, high mortality was observed in group T<sub>2</sub> immediately after weaning at 1<sup>st</sup> and 2<sup>nd</sup> post weaning week which might be due to the weaning stress as well as occurrence of diseases; as half of the piglets in this group were weaned at day 24 and the other half were regrouped at day 28, there was fighting among the piglets after mixing of piglets among the same litter, which leads to increase in the weaning stress [24].

Differences in pre weaning, post weaning, overall mortality and survivability recorded by different workers with the present findings might be due to differences in breed, weaning age, feeding, rearing period and other managerial practices.

### 4.2 Incidence of Diarrhoea

Incidence of diarrhoea in LWY piglets from birth to 10<sup>th</sup> week under different weaning groups has been expressed in percentage and presented in table 1.

The data revealed that the incidence of diarrhoea was higher in all 3 weaning groups during the 1<sup>st</sup> and 2<sup>nd</sup> week of post weaning period and decreased afterwards which is supported by previous workers [24] which might be due weaning stress, sudden changed in the feed as well as environment. Early weaning on day 21 vs. day 35 is more stressful for the piglets and piglets are more susceptible to impaired gastrointestinal function [19]. After weaning when piglets are switch from

liquid milk based diet to a solid grain based diet resulting in reduced post-weaning growth, reduced feed intake, and diarrhoea thereby reducing piglet welfare [6].

The data also revealed that the overall incidence of diarrhoea from birth to 10<sup>th</sup> weeks were not significant among the different weaning groups.

**Table 1:** Incidence of diarrhoea in piglets (%) from 1<sup>st</sup> to 10<sup>th</sup> week of age under different weaning groups

Age in week	At day 24 (T <sub>1</sub> )	Split weaning at day 24 and 28 (T <sub>2</sub> )	At day 28 (T <sub>3</sub> )	Chi square test value
1 <sup>st</sup>	0(0)	0(0)	0(0)	0
2 <sup>nd</sup>	0(0)	3.64(2)	3.70(2)	3.76 <sup>NS</sup>
3 <sup>rd</sup>	6.25(3)	7.55(4)	14.81(8)	4.93 <sup>NS</sup>
4 <sup>th</sup>	20.83(10)	13.21(7)	9.26(5)	5.61 <sup>NS</sup>
5 <sup>th</sup>	31.25(15) <sup>b</sup>	49.02(25) <sup>a</sup>	51.02(25) <sup>a</sup>	9.63*
6 <sup>th</sup>	10.64(5) <sup>b</sup>	28.26(13) <sup>a</sup>	26.53(13) <sup>a</sup>	11.07*
7 <sup>th</sup>	8.51(4)	2.17(1)	4.08(2)	4.52 <sup>NS</sup>
8 <sup>th</sup>	6.38(3)	0(0)	2.04(1)	7.78 <sup>NS</sup>
9 <sup>th</sup>	0(0)	4.35(2)	0(0)	8.83*
10 <sup>th</sup>	4.34(2)	2.17(1)	0(0)	4.44 <sup>NS</sup>
Overall (1-10 <sup>th</sup> week)	8.79(42)	11.07(55)	10.92(56)	0.35 <sup>NS</sup>

\* Significant (P<0.05) and <sup>NS</sup> Non-significant

Note: Means bearing at least one common superscript in each row do not differ significantly. Figures in parenthesis indicate the number of piglets suffered.

#### 4.3 Haemato-biochemical parameters

The mean  $\pm$  SE of haemato-biochemical parameters namely Glucose, Haemoglobin, Total Protein, Albumin, Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT) and Blood Urea Nitrogen (BUN) have been presented in the Table 2. The haemato-biochemical parameters are altered from the normal range observed when the piglets are in adverse stress condition, disease condition which will directly affect on performance piglets [4].

The level of blood glucose (mg/dl) in pigs at day 24, 28, 35, 42 and 70 ranged from 101.50 $\pm$ 2.19 to 122.68 $\pm$ 9.44 in T<sub>1</sub> (day 24 weaning group) and 109.80 $\pm$ 2.38 to 112.55 $\pm$ 2.14 in T<sub>3</sub> (day 28 weaning group) which resembled with the reports of previous workers [3, 12].

The level of haemoglobin (g%) in pigs at day 24, 28, 35, 42

and 70 ranged from 9.92 $\pm$ 0.65 to 10.95 $\pm$ 0.31 in T<sub>1</sub> group and 9.63 $\pm$ 0.28 to 10.95 $\pm$ 0.67 in T<sub>3</sub> group. The haemoglobin levels in both group were in the ranges of previous reports [22, 3, 5, 17].

The level of total protein (g/dl) in pigs at day 24, 28, 35, 42 and 70 ranged from 4.50 $\pm$ 0.53 to 5.75 $\pm$ 0.33 in T<sub>1</sub> group and 4.64 $\pm$ 0.16 to 6.01 $\pm$ 0.30 in T<sub>3</sub> group. Similar total protein (g/dl) levels were reported by previous workers [3, 17].

The level of Albumin (g/dl) in pigs at day 24, 28, 35, 42 and 70 ranged from 3.02 $\pm$ 0.35 to 3.61 $\pm$ 0.13 in T<sub>1</sub> group and 2.80 $\pm$ 0.25 to 3.80 $\pm$ 0.13 in T<sub>3</sub> group which is correlates with previous study [12].

The level of AST (IU/l) in pigs at day 24, 28, 35, 42 and 70 ranged from 31.77 $\pm$ 2.24 to 36.87 $\pm$ 3.19 in T<sub>1</sub> group and 28.93 $\pm$ 3.18 to 34.28 $\pm$ 6.80 in T<sub>3</sub> group. The level of ALT (IU/l) in pigs at day 24, 28, 35, 42 and 70 ranged from 27.23 $\pm$ 1.40 to 37.02 $\pm$ 4.11 in T<sub>1</sub> group and 28.25 $\pm$ 3.09 to 38.32 $\pm$ 3.26 in T<sub>3</sub> group, which were in normal ranges. These findings were agreed with earlier findings [3, 12, 17].

**Table 2:** Mean ( $\pm$  se) haemato-biochemical parameters of weaned pigs at 24, 28, 35, 42 and 70 days under different weaning groups.

Parameters	Age(days)	At day 24 weaning (T <sub>1</sub> )	At day 28 weaning (T <sub>3</sub> )	t-value
Glucose (mg/dl)	24	110.70 $\pm$ 5.97	-	-
	28	122.68 $\pm$ 9.44	112.22 $\pm$ 3.56	1.037 <sup>NS</sup>
	35	101.50 $\pm$ 2.19	109.80 $\pm$ 2.38	2.56 <sup>NS</sup>
	42	122.42 $\pm$ 7.69	112.55 $\pm$ 2.14	1.24*
	70	115.82 $\pm$ 6.50	114.35 $\pm$ 3.31	0.20 <sup>NS</sup>
Haemoglobin (g %)	24	9.93 $\pm$ 0.41	-	-
	28	9.92 $\pm$ 0.65	10.40 $\pm$ 0.60	0.74 <sup>NS</sup>
	35	10.45 $\pm$ 0.15	9.63 $\pm$ 0.28	2.57 <sup>NS</sup>
	42	10.95 $\pm$ 0.31	10.58 $\pm$ 0.52	0.60 <sup>NS</sup>
	70	11.85 $\pm$ 0.72	10.95 $\pm$ 0.67	0.92 <sup>NS</sup>
Total protein (g/dl)	24	4.92 $\pm$ 0.39	-	-
	28	4.50 $\pm$ 0.53	6.01 $\pm$ 0.30	2.47 <sup>NS</sup>
	35	5.46 $\pm$ 0.32	4.64 $\pm$ 0.16	2.27 <sup>NS</sup>
	42	5.22 $\pm$ 0.24	5.31 $\pm$ 0.75	0.11 <sup>NS</sup>
	70	5.75 $\pm$ 0.33	5.98 $\pm$ 0.28	0.52 <sup>NS</sup>
Albumin (g/dl)	24	3.26 $\pm$ 0.27	-	-
	28	3.02 $\pm$ 0.35	3.53 $\pm$ 0.21	1.27 <sup>NS</sup>
	35	3.61 $\pm$ 0.13	2.80 $\pm$ 0.25	2.87 <sup>NS</sup>
	42	3.35 $\pm$ 0.36	3.25 $\pm$ 0.44	0.17 <sup>NS</sup>
	70	3.60 $\pm$ 0.15	3.80 $\pm$ 0.13	1.01 <sup>NS</sup>
AST(IU/l)	24	36.87 $\pm$ 3.19	-	-
	28	32.97 $\pm$ 4.39	28.93 $\pm$ 3.18	0.75 <sup>NS</sup>
	35	36.65 $\pm$ 4.34	34.28 $\pm$ 6.80	0.29 <sup>NS</sup>
	42	35.47 $\pm$ 1.36	30.00 $\pm$ 3.42	1.49 <sup>NS</sup>
	70	31.77 $\pm$ 2.24	33.00 $\pm$ 3.62	0.29 <sup>NS</sup>
	24	32.60 $\pm$ 4.13	-	-

ALT (IU/l)	28	37.02±4.11	38.32±3.26	0.25 <sup>NS</sup>
	35	27.23±1.40	28.48±2.96	0.38 <sup>NS</sup>
	42	28.78±2.69	28.25±3.09	0.13 <sup>NS</sup>
	70	33.28±4.93	36.71±3.21	0.58 <sup>NS</sup>
BUN (mg/dl)	24	8.62±0.79	-	-
	28	8.63±0.97	13.08±2.11	1.92 <sup>NS</sup>
	35	11.77±1.01	9.12±1.18	1.71 <sup>NS</sup>
	42	9.37±1.40	13.57±0.54	2.81 <sup>NS</sup>
	70	10.83±0.63	9.88±0.94	0.85 <sup>NS</sup>

\*Significant ( $P<0.05$ ) and <sup>NS</sup> Non-significant

The BUN (mg/dl) levels in pigs at day 24, 28, 35, 42 and 70 ranged from 8.62±0.79 to 11.77±1.01 in T<sub>1</sub> group and 9.12±1.18 to 13.57±0.54 in T<sub>3</sub> weaning group. The BUN (mg/dl) levels in both groups were in the ranges of previous reports [3, 17].

Statistical analysis revealed non-significant differences in blood glucose Haemoglobin, Total Protein, Albumin, Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT) and Blood Urea Nitrogen (BUN) levels during different periods between T<sub>1</sub> and T<sub>3</sub> weaning groups, however at day 42 blood glucose level was significantly ( $P<0.05$ ) lower in day 28 weaning group as compare to day 24 weaning group that might be due to individual variation.

## 5. Conclusion

From the present study it can be concluded that weaning of piglets at day 24 or 28 or split weaning at day 24 & 28 did not have any significant effect on mortality rates, incidence of diseases and Haemato-biochemical parameters in piglets upto 70 days of age.

## 6. Acknowledgements

Author wishes to thank the Dean, College of Veterinary Science & Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram, and DBT for providing the necessary facilities to carry out the study.

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