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EFFECT OF CLIMATE ON LITTER TRAITS OF CROSSBRED PIGS IN MIZORAM

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ABSTRACT

A study on seasonal effect of climate on the litter traits of cross bred pigs was undertaken in different districts of Mizoram such as Aizawl, Lunglei, Champhai and Kolasib. Data of 11 years i.e. January 2002 to December 2012 was collected from a total of 11,376 animals. Meteorological data was also collected from MIRSAC. The average litter size at birth

ranges from 6.469±0.15 to 6.853±0.15 and litter weight from 7.100±0.20 to 7.843±0.19 kg. However, there was non-significant difference between litter traits at the time of piglet birth in different seasons. However, at the time of weaning, average litter size ranges from 5.484±0.14 to 5.995±0.14 and litter weight ranges from 49.92±1.28 to 55.27±1.20 kg. There was significant differences in litter size at weaning (P<0.05) as well as litter weight at weaning (P<0.01). This indicates that season has significant effect on litter traits at the time of weaning.

Key Words : Season, litter traits, performance, cross-bred pigs.

The high percentage of tribal population in Mizoram[1] in North Eastern states might be one of the factor for high demand of pork[13]. The state experiences the influence of south-west monsoon and adequate amount of rainfall therefore it is characterized by short winter, long summer with heavy rainfall[11]. The present findings revealed four types of seasons i.e. winter, spring, summer/ autumn and autumn and this might influence the reproductive performance of pigs.

MATERIALS AND METHODS

The study on seasonal effect of climate on the litter traits of cross bred pigs was carried out in organized farms located in different districts such as Aizawl, Lunglei, Champhai and Kolasib. The data for the present investigation was collected from a total of 11,376 animals born from 1280 farrowing over a period of 11 years i.e. January 2002 to December 2012. Monthly information of meteorology (January 2002 to December 2012) in ambient temperature, relative humidity and rainfall were collected from Mizoram Remote Sensing Application Center, Aizawl, Science and Technology, Planning Department, Govt. of Mizoram. Litter traits such as litter size and litter weight at the birth and weaning were recorded. For analysis of data, SAS Software (9.4 version) was used which is available at Department of Biostatistic, College of Veterinary Science, AAU, Khanapara, Guwahati-22. Pearson's correlation method was used for finding out the correlation between seasons and litter traits.

RESULTS AND DISCUSSION

The average temperature, relative humidity and rainfall showed significant difference (P<0.01) between the four seasons (Table-1 and Table-1.1). The average litter size and litter weight at birth and at weaning respective was given in Table 2.

At birth:

The average litter size at birth ranges from 6.469±0.15 to 6.853±0.15 and litter weight from 7.100±0.20 to 7.843±0.19 kg (Table-2). However, there was non-significant difference (Table-2.1 and 2.2) between the seasons and this finding is supported by earlier workers[4, 6] .

At weaning:

The average litter size at weaning ranges from 5.484±0.14 to 5.995±0.14 and litter weight at weaning ranges from 49.92±1.28 to 55.27±1.20 kg (Table 2). There was significant differences in litter size at weaning (P<0.05) as well as litter weight at weaning (P<0.01) as given in Table-2.3 and Table-2.4. Litter size at weaning was highest during autumn and litter weight at weaning was highest during summer/monsoon and autumn season. This is because temperature during summer/monsoon (18.84 - 30.68°C) and autumn (16.06 - 29.22°C) is more suitable for the growth of piglets (Table-1). Moreover, the pre-weaning mortality percent was lowest i.e. 11.73-12.63 % which might increased the litter size at weaning. This indicates that warmer temperature is suitable for the growth of piglets. Season having significant effect on litter performance was also reported[2,4 & 8].

Correlation between seasons and litter traits:

Season has negative correlation (P<0.05) with the litter traits during winter and summer/ monsoon (Table-3). In winter, mean temperature is having a negative correlation with litter size at weaning and litter weight at weaning. This is because during winter, when the mean temperature goes down, piglets increased their consumption to compensate their heat loss. In summer, mean temperature is having negative correlation with litter size at birth and rainfall is also having negative correlation with litter size at weaning. This can be explained by the fact that during summer, high rise in the mean temperature is stressful for the pregnant sows thus reducing the litter size at birth. This observation is supported by earlier workers[3] who studied the seasonal infertility in Kenyan pig breeding units and reported that high ambient temperature was a risk factor for reproductive performance in pig breeding units. During monsoon, the heavy rainfall led to the death of many piglets due to diarrhoea. The high mortality of piglets during this season led to reduction in litter size at weaning. In support to the present finding, ealier workers[9 &14] also reported negative correlation between air temperature and reproductive traits. The overall reproductive performance of pigs was affected by seasons. In support to this observation, similar works were reported[5,7,9,10 &12].

TABLE 1: AVERAGE TEMPERATURE, RAINFALL AND RELATIVE HUMIDITY IN DIFFERENT SEASONS

SEASON	TEMPERATURE (°C)				RAINFALL(mm)		HUMIDITY (%)	
	N	MAXIMUM	MINIMUM	MEAN	N	MEAN	N	MEAN
WINTER	86	24.233±0.49^{D}	9.992±0.59^{D}	17.11±0.39^{D}	88	18.946±0.5.99^{C}	84	71.108±0.69^{C}
SPRING	55	27.431±0.57^{C}	12.061±0.76^{C}	19.746±0.45^{C}	56	25.119±5.13^{C}	54	64.706±1.23^{D}
SUMMER/ MONSOON	289	30.684±0.23^{A}	18.839±0.29^{A}	24.761±0.15^{B}	294	395.68±24.07^{A}	282	84.701±0.58^{A}
AUTUMN	86	29.219±0.41^{B}	16.06±0.56^{B}	22.643±0.33^{A}	88	161.52±26.31^{B}	84	81.266±0.53^{B}
Total	516	29.018±0.21	16.180±0.27	22.599±0.18	526	254.03±15.92	504	79.721±0.49

Means within each column bearing at least one common superscript do not differ significantly
ABCD (P<0.01)

TABLE 2 : AVERAGE LITTER SIZE AND LITTER WEIGHT AT BIRTH AND AT WEANING IN DIFFERENT SEASONS

SEASON	N	AT BIRTH		AT WEANING	
		Litter Size	Litter Weight (Kg)	Litter Size	Litter Weight (Kg)
WINTER	224	6.563 ± 0.14^{NS}	7.217±0.19^{NS}	5.543 ± 0.14^{bc}	51.201±1.26^{B}
SPRING	177	6.469 ± 0.15^{NS}	7.100±0.20^{NS}	5.484 ± 0.14^{c}	49.916±1.28^{B}
SUMMER/MONSOON	654	6.805 ± 0.08^{NS}	7.843±0.19^{NS}	5.854 ± 0.09^{ab}	53.923±0.80^{A}
AUTUMN	225	6.853 ± 0.15^{NS}	7.181±0.18^{NS}	5.995 ± 0.14^{a}	55.271±1.20^{A}

Means within each column bearing at least one common superscript do not differ significantly
AB (P<0.01); abc (P<0.05); NS (Non-significance)

TABLE 1.1: ANOVA RESULT FOR CLIMATIC ELEMENTS IN DIFFERENT SEASONS

		Sum of Squares	df	Mean Square	F	Sig.
MAXIMUM TEMPERATURE	Between Groups	2913.167	3	971.056	58.66	0.00
	Within Groups	8475.701	512	16.554		
	Total	11388.87	515			
MINIMUM TEMPERATURE	Between Groups	6270.673	3	2090.224	79.722	0.00
	Within Groups	13424.1	512	26.219		
	Total	19694.78	515			
MEAN TEMPERATURE	Between Groups	4388.147	3	1462.716	175.285	0.00
	Within Groups	4272.524	512	8.345		
	Total	8660.67	515			
RAINFALL (mm)	Between Groups	14450000	3	4816731	45.268	0.00
	Within Groups	55540000	522	106404.4		
	Total	69990000	525			
RELATIVE HUMIDITY (%)	Between Groups	25599.43	3	8533.143	116.957	0.00
	Within Groups	36479.88	500	72.96		
	Total	62079.31	503			

TABLE 2.1: ANOVA RESULT OF AVERAGED LITTER SIZE AT BIRTH IN DIFFERENT SEASONS

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Season	3	1.54947557	0.51649186	0.95	0.4271
Error	30	16.24174782	0.54139159		
Corrected Total	43	29.34257702			

TABLE 2.2: ANOVA RESULT OF AVERAGE LITTER SIZE AT WEANING IN DIFFERENT SEASONS

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Season	3	3.76955554	1.25651851	3.76	0.0211
Error	30	10.03557420	0.33451914		
Corrected Total	43	24.05304567			

TABLE 2.3: ANOVA RESULT FOR AVERAGE LITTER WEIGHT AT BIRTH(Kg) IN DIFFERENT SEASONS

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Season	3	2.42856515	0.80952172	1.17	0.3387
Error	30	20.81050096	0.69368337		
Corrected Total	43	51.68716650			

TABLE 2.4: ANOVA RESULT FOR AVERAGE LITTER WEIGHT AT WEANING(Kg) IN DIFFERENT SEASONS

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Season	3	583.19361	194.39787	7.19	0.0009
Error	30	810.84024	27.028008		
Corrected Total	43	2171.6131			

CONCLUSION

Seasons has significant on the performance of piglet especially at the time of weaning. However, non-significant effect was found at the time of birth. During summer, increase in the mean temperature and humidity is stressful for the adult sows which might reduce the litter size at birth. Lower in mean temperature during winter is stressful for young piglets however warm temperature favours the growth of piglets. Rainfall may be responsible for disease outbreak thus affecting the litter performance.

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