



## Lameness, Associated Risk Factors and its Management in Pig under Traditional Farming System in Mizoram, India

Hitesh Bayan<sup>1\*</sup>, Devajani Deka<sup>2</sup>, Bedanga Konwar<sup>1</sup> and Basanta Saikia<sup>1</sup>

<sup>1</sup>Department of Veterinary Surgery & Radiology, College of Veterinary Sciences & Animal Husbandry Central Agricultural University, Selesih, Aizawl, Mizoram, INDIA

<sup>2</sup>Department of Veterinary Public Health & Epidemiology, College of Veterinary Sciences & Animal Husbandry Central Agricultural University, Selesih, Aizawl, Mizoram, INDIA

\*Corresponding author: H Bayan; E-mail: hbayan@gmail.com

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### ABSTRACT

The study was conducted in Aizawl and Kolasib district of Mizoram, India in 375 numbers of randomly selected pig farms covering 1126 numbers of pigs. The base line survey was conducted using a structured questionnaire. The pigs under study were distributed in different age groups as < 1 months, 1-3 months, 4-6 months, 7-9 months and 10-12 months and above 1 year. The calendar year under study was divided in to four seasons viz. summer, monsoon, retreating monsoon and winter. Different breeds were classified as Yorkshire, Hampshire, Cross breed and Zovawk (indigenous). The disease conditions were observed and diagnosed on the basis of history, clinical signs, clinical, haemato-biochemical and laboratory examination like radiography and bacteriological examination and antibiotic sensitivity test as and when required. After evaluation of the lameness, the animals were treated accordingly and outcomes were evaluated. The rate of incidence of lameness was found to be 7.46 percent with a sex wise incidence of 8.67 percent in males and 5.96 percent in females. Incidence was highest in crossbreed pigs (7.57%) and in the age group of 1-3 months (12.37%). Leg wise affections were highest in foreleg (48.81%) followed by hind leg (38.10%) and both legs (13.10%). Foreleg affections were highest (54.55%) in the age group of 7-9 months and lowest (42.86%) in pigs >12 months. Hind leg affections (57.14%) was highest in >12 months and lowest (30.34%) in the age group of 1-3 months. Sixty five percent wound cases were bacteriologically positive with 53.00 percent infected wounds of polymicrobial nature.

**Keywords:** Lameness, pig, risk factors

Topographically, the North Eastern Region of India is characterized by difficult terrains and the mountainous topography has brought limitations to extensive agricultural operations. Animal husbandry plays a vital role in the economy by supplementing the income of the rural households and generates gainful employment to marginal and small farmers, particularly to the landless agricultural labourers. Pig keeping is a tradition for tribal people of Northeast India; however, scientific rearing and large stock are not practiced probably due to small land holding and hilly terrain of the region. Farmers generally rear pig in traditional intensive farming system. Lameness in pigs has been an issue in swine production for many years and continues to be a worldwide problem.

Locomotor disorders are among the most relevant health problems in pig production worldwide. Beside the disturbances of animal wellbeing, the financial losses are of significance especially due to prolonged fattening period, losses of young pigs, reduced reproductive efficiency in sows and boars and early culling of fattening or breeding pigs (Waldmann, 2004). Diagnosis of lameness is complex as may involve lesions of at least three body systems (musculoskeletal, nervous and integumentary) independently or in combination (Hill, 2010). Keeping in view the extent of the problem under existing system of pig rearing in Mizoram, the study was undertaken on lameness, associated risk factors and its management in pig.

## MATERIALS AND METHODS

The base line study was under taken in Aizawl and Kolasib districts of Mizoram, India. A total of 375 pig farmers were surveyed covering a total number of 1126 pigs. Information regarding the total number of animals present, type of housing, feeding and management, number of animals affected, seasonal influence, breed, age and sex of the animals were recorded. The pigs under study were distributed in different age groups as < 1, 1-3, 4-6, 7-9, 10-12 and >12 months. The calendar year under study was divided in to four seasons viz. summer (March - May), monsoon (June - September), retreating monsoon (October - November) and winter (December - February). Different breeds were classified as Large White Yorkshire, Hampshire, Cross breed and Zovawk (indigenous). The disease conditions were observed and diagnosed on the basis of history, clinical examination and suitable laboratory techniques as required. The changes in physiological, haematological and biochemical parameters were recorded. The swab samples/ synovial fluid in sterile nutrient broth were collected and subjected to the isolation and identification of the bacterial organisms using standard bacteriological methods. The isolated bacterial organisms were subjected to *in vitro* antibiotic sensitivity test against 10 commonly used antibiotics as per CLSI guidelines (2014). Plain radiographs were taken to detect any bone or

joint abnormality in lame pigs. Statistical analysis of data was done with Turkey Anova and Chi-square test using software of SPSS (Version 16.0).

## RESULTS AND DISCUSSION

The incidence rate of lameness in pig was found to be 7.46 percent with highest incidence rate of lameness in the age group of 1-3 months (12.37%) and lowest in the age group of 10-12 months (4.47%) with significant variation ( $p < 0.5$ ) indicating higher susceptibility of lameness in younger age group of animals. The sex wise incidence rate was recorded higher in males (8.67%) than females (5.96%) although statistically non-significant (Table 1). The breed wise incidence rate of lameness was observed highest in Crossbreed (7.57%) and least in Zovawk (6.60%) without statistical variation Table 1. Season wise, highest incidence of lameness was recorded during monsoon (30.95%) followed by retreating monsoon (28.57%), summer (21.43%) and winter (19.05%). Limb wise distribution of lameness were recorded highest in fore limb (48.81%) followed by hind limb (38.10%) and both limbs (13.10%). The highest fore limb affection (54.55%) was observed in the age group of 7-9 months and lowest in the age group of >12 months (42.86%). A significantly ( $p < 0.05$ ) higher incidence of hind limb affections were recorded in adult animals (>12 months) (57.14%) followed by 10-12 months

**Table 1:** Incidence of lameness in pigs according to sex, breed and age under traditional system of rearing in Mizoram

	Affected no.	Affected %	Not affected no.	Not affected %	Total pigs Surveyed	Chi-square value
<b>Sex wise incidence</b>						
Male	54	8.67	569	91.33	623	0.5416 <sup>NS</sup>
Female	30	5.96	473	94.04	503	
<b>Breed wise incidence</b>						
Yorkshire	21	7.53	258	92.47	279	0.0975 <sup>NS</sup>
ZoVawk	7	6.60	99	93.40	106	
Hampshire	13	7.51	160	92.49	173	
Cross breed	43	7.57	525	92.43	568	
<b>Age wise incidence</b>						
< 1 months <sup>ab</sup>	18	10.40	155	89.60	173	4.05*
1-3 months <sup>b</sup>	23	12.37	163	87.63	186	
4-6 months <sup>ab</sup>	17	7.80	201	92.20	218	
7-9 months <sup>ab</sup>	11	4.76	220	95.24	231	
10-12 months <sup>a</sup>	8	4.47	171	95.53	179	
Above 1 year <sup>a</sup>	7	5.04	132	94.96	139	

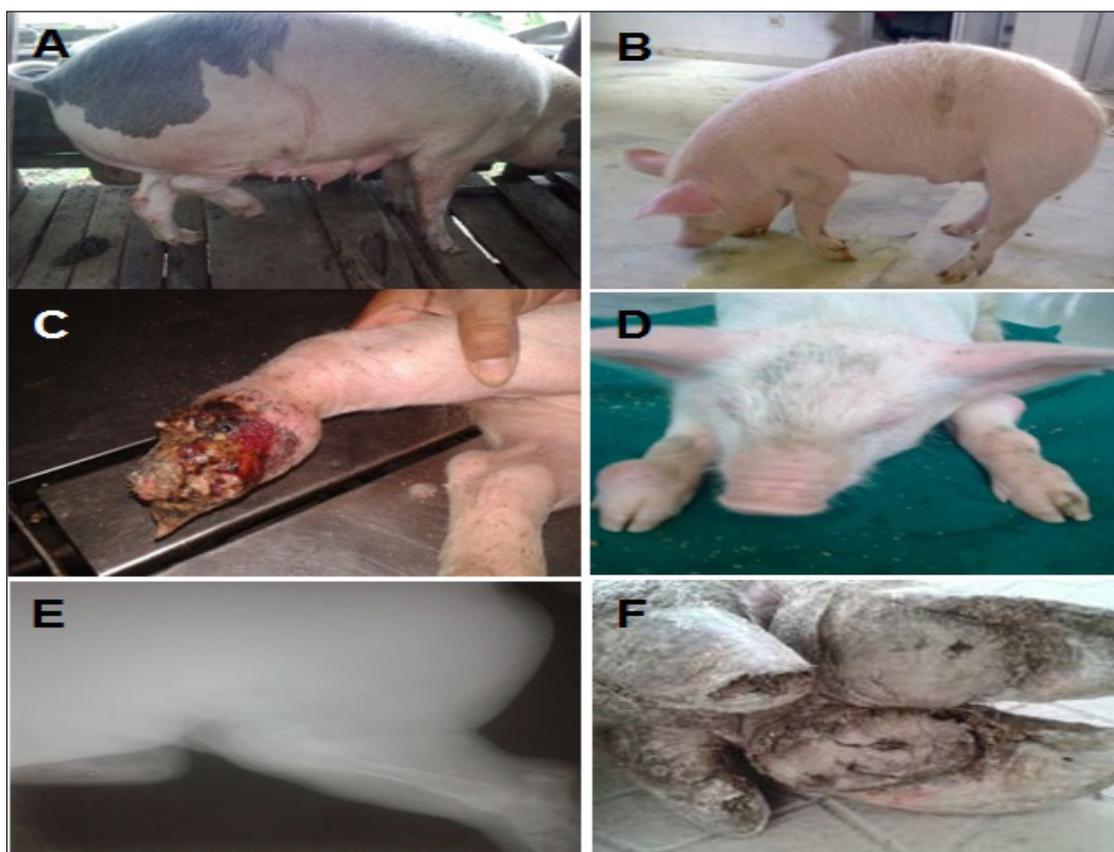
(50.00%), 4-6 months (41.18%), 7-9 months (36.36%), < one month (33.33%) and lowest in the age group of 1-3 months (30.34%) (Table 2).

The presence (prevalence and/ or incidence) of lameness is commonly used as measures of health and welfare in pigs (Fig. 1). The present study indicated the principal causes of lameness were attributed to the factors associated

with housing and management. The floor types used in farm houses were found to be mostly wooden plank type (91.20%) and only 8.80 percent farms were recorded with concrete floor type. Rearing one pig per pan was found to be practised by 48.53 percent farmers followed by 2-5 pigs by 38.40 percent farmers and more than 5 pigs per pan by 13.07 percent farmers. Falling from the sty

**Table 2:** Limb wise incidence of lameness in pigs under traditional system of rearing in Mizoram

Age group	Fore limb	%	Hind limb	%	Both fore and hind limb	%	Total
< 1 months	8	44.44	6	33.33 <sup>c</sup>	4	22.22	18
1-3 months	12	52.17	7	30.43 <sup>c</sup>	4	17.39	23
4-6 months	8	47.06	7	41.18 <sup>b,c</sup>	2	11.76	17
7-9 months	6	54.55	4	36.36	1	9.09	11
10-12 months	4	50.00	4	50.00 <sup>ab</sup>	0	0.00	8
Above 1 year	3	42.86	4	57.14 <sup>a</sup>	0	0.00	7
<b>Total</b>	<b>41</b>	<b>48.81<sup>NS</sup></b>	<b>32</b>	<b>38.10<sup>*</sup></b>	<b>11</b>	<b>13.10</b>	<b>84</b>



**Fig. 1:** Lameness in pigs. (A) Sow showing the signs of lameness; (B) Growing pig with lameness; (C) Necrotic wound in pig; (D) Polyarthritis in piglet; (E) Fracture of tibia in pig; (F) Sole ulcers in pig

or trapping of leg in the floor was found to be the major cause (42.86%) of lameness and was significantly higher ( $p < 0.05$ ) in the age group of 1-3 months (52.17%) than the age group above 12 months (28.57%). Stepping by the sow was recorded in 27.78 percent lameness cases only in the age group below one month. Lameness due to wound was recorded as 27.38 percent with significantly ( $p < 0.05$ ) higher incidence rate in the age group of >12 months (42.86%) than age group <one month (11.11%) (Table 3). Lameness due to arthritis was recorded in 8.33 percent cases without significant variation in different age groups. Other problems leading to lameness included hoof over growth, injury during restraining for administration of drug etc.

The study revealed that age is a relevant lameness associated risk factor along with the understanding of farm management system. Housing appeared to be an important factor influencing the level of lameness when individual herds have been examined (Barnett *et al.*, 2001; Smith, 2003; Dewey, 2006). The small farming system with 2-5 numbers of pigs made it easier to evaluate animals individually along with consideration of management system which might have influenced the occurrence of lameness in pigs. The higher incidences of lameness in young pigs < 3 months were probably due to the falling from the sty as the pig stys are constructed on the slope hills and they are often stepped by their mothers. Falling from the sty further lead to the fractures and wound and subsequently catch the infections. The pig stys under the traditional housing system on solid floor were made up of locally available materials like wooden plank and bamboo often resulted in cuts and grazes in knees, fetlocks, elbows

and hocks. The floor surfaces were not even and there were presence of gaps or holes in the floor leading to trapping of legs. Open nails and sharp edges of tins or wood inflicted trauma causing wound, abscess etc. Slipping of leg through broken floor, falling or jumping from the sty led to trauma and even caused fracture. Wound, bursitis and abscess in legs and body were associated with increased risk of lameness in sow herds (Knage-Rasmussen *et al.*, 2014). In case of indoor units, younger animals had higher risk of lameness (Willgert *et al.*, 2014). However, Mohsina *et al.* (2014) reported much lower incidence (0.19%) of lameness involving only left hind leg in pigs due to wound in large white York shire under scientific managerial system. In two different studies, Zhou *et al.* (1995) and Dewey (2006) also reported that the piglets spend most of the time lying on the floor during first week of life and become susceptible for injuries leading to lameness.

The haematological values were found within the normal physiological limit in most of the cases of lameness in pigs except in few cases of infectious arthritis or infected wound where an increase TLC with neutrophilia was recorded. The present study indicated that a proportion of 27.38 percent lameness cases in pigs were due to wound and 65.00 percent wound cases were found to be bacteriologically positive. Poly microbial infections were recorded in 53.00 percent of wound cases. However, 33.33 percent of infected wounds were caused by only *Staphylococcus aureus*. All the arthritis cases were monomicrobial either with *Staphylococcus aureus* or *Streptococcus* spp. Four cases of fracture in piglets involving the bones namely humerus, femur, tibia and radius were recorded by using plain radiography attributing to the causes like falling

**Table 3:** Incidence of lameness in pigs according to etiological factors under traditional system of rearing in Mizoram

Age group	Falling from sty /trapped in the broken floor	%	Stepped by the sow	%	Open wound due to trauma	%	Arthritis	%	Other	%	Total
< 1 months	8	44.44 <sup>a</sup>	5	27.78	2	11.11 <sup>b</sup>	2	11.11	2	11.11	18
1-3 months	12	52.17 <sup>a</sup>	0	0.00	6	26.09 <sup>ab</sup>	3	13.04	4	17.39	23
4-6 months	6	35.29 <sup>ab</sup>	0	0.00	5	29.41 <sup>ab</sup>	1	5.88	4	23.53	17
7-9 months	5	45.45 <sup>a</sup>	0	0.00	4	36.36 <sup>ab</sup>	1	9.09	1	9.09	11
10-12 months	3	37.50 <sup>ab</sup>	0	0.00	3	37.50 <sup>ab</sup>	0	0	1	12.50	8
Above 1 year	2	28.57 <sup>b</sup>	0	0.00	3	42.86 <sup>a</sup>	0	0	1	14.29	7
<b>Total</b>	<b>36</b>	<b>42.86*</b>	<b>5</b>	<b>5.95</b>	<b>23</b>	<b>27.38*</b>	<b>7</b>	<b>8.33 NS</b>	<b>13</b>	<b>15.48 NS</b>	<b>84</b>

from the sty, trapping of the leg in the broken floor and improper handling during injection of medicine without any osteoarthritis or other bone lesions.

In this study, different conditions namely wounds of different types, abscess, arthritis, fractures and joint affections causing lameness in pigs were noticed and necessary treatments of these conditions were provided to maintain the structural and functional integrity of the limbs. Abrasion, lacerations, necrotic and ulcerating wounds were successfully treated by cleaning the wounds with agents such as potassium permanganate solution, hydrogen peroxide solution and povidone iodine solutions and herbal fly repellent sprays along with systemic antibiotics, non-steroidal anti-inflammatory analgesic agents, antihistaminic, serratiopeptidase and supplement of multi-vitamin and minerals. Systemic antibiotic and intra-synovial antibiotic therapy was found to be effective in young pigs suffering from infectious arthritis except in one case in which the piglet was also suffering from diarrhoea. Similar findings were also reported by Josianssen and Christensen (1999). However, maggot infested wounds were treated with commercial antimaggot preparations in routine manner.

Empiric antibiotic treatment was given after collection of wound samples in acute and contaminated wounds and choice of antibiotic was changed after bacteriological examination and antibiotic sensitivity tests of the isolated bacterial organisms in few cases where it was necessary. However, in leg ulcer cases, the antibiotic treatment was given only after antibiotic test was performed where there is likely to be polymicrobial nature. In wounds that have failed to resolve over time to empiric antibiotic treatment, antibiotic choice was directed by the relevant susceptibilities provided by antimicrobial susceptibility test. Microbiological assessment could be important in the management of infected wounds and infectious arthritis. Information on the microbiological species present in the wound and synovial fluid was useful for determining antibiotic choice and predicting response to treatment. In clinical practice, it is not possible to differentiate between pathogenic and non-pathogenic organisms, however, foot infections are frequently associated with *Staphylococcus aureus*, *Streptococcus* spp., *Pseudomonas aeruginosa*, *Enterococcus* spp. and coliform bacteria. Bacterial infection with multiple species produces a synergistic effect, leading to increased

production of virulence factors and greater delays in healing. It is opined that probably aerobic or facultative pathogens in particular *S. aureus*, *P. aeruginosa* and beta-haemolytic *Streptococcus* are the primary causes of delayed healing in both acute and chronic wounds (Zoric *et al.*, 2004).

The fracture of radius and tibia were successfully treated by external immobilization using bamboo splint and plaster of paris although the mild lameness persisted. Post recovery radiography was not possible for evaluation of alignment and healing of fracture as it was difficult to bring back the animals to the institute again. The fracture of humerus and femur were not treated as the owners opted for culling of the animals instead of invasive orthopaedic procedure. As majority of the farmers raise pigs for fattening, claw or hoof related lameness in pigs was less and one case each of elongated hooves and sole ulcer were noticed in breeding animals >12 months of age. The breeding animals were housed individually. Pluym *et al.* (2011) reported a high incidence rate of hoof and claw lesion in group housing system and concluded that the claw lesions are less in single housing system.

## CONCLUSION

The traditional pig housing system practice in Mizoram with low input in bamboo/ wood settlements invited the different types of lameness. The appropriate management of a pig farm is critical to prevent new cases of lameness, and/or recurrent cases of lameness. Proper housing is a key component in managing lameness. To minimize the risk of injury and disease, pig housing must be scientifically designed. The problem of lameness due to aggressive behaviours were found to be less as most of the pigs were housed individually or group of two numbers as there is less chance of competition at feeding hours.

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