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## Pre weaning piglets mortality and associated factors in adopted pig management practices under Dhalai district of Tripura, India

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### Abstract

Piglets mortality in adopted pig rearing practices of Dhalai district of Tripura, India were identified as Crushing, starvation, weakness, diarrhoea, stillbirths, congenital deformity, predator, savaging, environmental stress, respiratory stress, unknown causes. Pre weaning mortality was 27.75% between piglets born to weaning (0 to 60 days) and 50.73% mortality occur within three days of piglets life. Crushing, starvation & weakness, diarrhoea, stillbirths was main four causes contributed about 65.2%. Congenital deformity, predator, savaging, environmental stress, respiratory stress contributed about 24.94% and unknown causes were 9.86%. Within first (1<sup>st</sup>) week of age 67.51% mortality occurs. Factor responsible for most pre weaning piglets mortality was management factor along with piglets and sow factor.

**Keywords:** Piglets, mortality, crushing, starvation, management factor

### 1. Introduction

Pig production is an attractive business for the reason that superior production efficiency per unit area of land (FAO, 2009) <sup>[10]</sup>. In Dhalai District, 70% area is covered by forest area and about 55.68% of the total population is belong to Schedule Tribe (ST) communities (Indian Census, 2011) <sup>[2]</sup>. Pig rearing is most important livestock among ST communities for their livelihood along with agricultural Jhum cultivation. The district has a prolonged rainy season and warm winters and with hot and humid summers of tropical climate. Rain are frequent in March to July. Pig farming is an important source of income for the farmers of Dhalai district about 76% or above people depend on agriculture and agricultural based allied farming. But piglet mortality considers being one of the major causes for economic loss in term of the production in pig farming. Pre weaning mortality is in general agreement with regard to major causes of crushing, starvation and disease (Varley, 1995) <sup>[22]</sup>. About 23 to 27% of piglets born alive has been reported dead before weaning in pens (Johnson *et al.* 2007; Kliebenstein *et al.* 2007; Li *et al.* 2010) <sup>[12, 13, 15]</sup>. So, more research work are needed to understand factors associated with piglet mortality, which will help sustain alternative swine production (Honeyman *et al.* 2006) <sup>[11]</sup>. Reflecting the economic importance of pre weaning mortality of piglets, the present study was conducted to identify the main causes of pre weaning mortality and associated factors under present study in pig rearing practices in field condition of Dhalai district, Tripura.

### 2. Materials and Methods

**2.1 Study design:** A descriptive cross-sectional survey and direct observation during visit to the pig farm were conducted for present study from January 2021 to February 2023 for the period of over two years. The location of the study was different part of Dhalai district of Tripura, India consisting different villages and block. The latitude and longitude of the area are 23.846698° N and 91.909924° E. The potential for pig farming and pig resources among the populations living in that area influenced the choice of this study in that location.

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The pig farms was chosen where piglet production is practices and total 147 pig farms was studied from different villages in the Dhalai districts. Total piglets number were 1715 and the age of piglets were ranges from 0 to 60 days (piglets born to weaning) as weaning practices at the age of 60 days in that area. The pig farm size was 1 to 8.

## 2.2 Data collection

Different villages in the districts were preferred for having the highest numbers of farms in the small range. Those farms that have at least 2 adult female pig reared for piglets production were included in the study. The pre weaning piglets mortality were recorded in the age group range from 0 to 60 days. The pig farm assessment related to pre weaning piglets mortality and associated factor responsible for that were mainly done based on the direct investigation by observing the physical finding in regular interval visits to the farms and extended interviews with farmers along family members. The farmer were interview face-to-face with structural questionnaire related to pre weaning piglets mortality and factors related to the adopted pig management practices under Dhalai district by the local pig farmers.

## 2.3. Statistical Data analysis

We collected the farm data set through a structured questionnaire and all data were entered in a Microsoft excel sheet.

## 3. Results and Discussion

Majority of pig farmers constructed their pigsty with locally available materials like bamboo and woods and cover with straw or tin and few farmers constructed pigsty with bricks (Das *et al.*, 2018) [3]. Tethering of pig below tree without any housing also practice by a good numbers of farmers. The floor space was found to be inadequate in majority of the farms for per adult pig. The feeding mainly kitchen waste along with homemade concentrate and locally available weds and vegetables after boiling (Das *et al.*, 2018, Sharma *et al.*, 2015) [3, 19]. All farmers practices natural breeding. It was recorded that supply of sufficient water to the pig is absent in almost all pig farm. No Separate farrowing pen for sows. There is absent of proper drainage system in the entire farm.

It this study 147 farmers were interviewed were having sows. Total piglets number were 1715 in the age of 0 to 60 days. In the study, data observed litter size varies 3 to 13 no's piglets. Total 477 piglets were death within pre weaning period of 2 months (0 to 60 days age) among 1715 numbers of live piglet born and mortality percentage was 27.75%. Major cause of mortality were recorded as crushing (26.83%), starvation and weakness (16.14%), diarrhoea (11.95%) as three main leading cause of pre weaning mortality in adopted pig management practices under Dhalai district of Tripura, India followed by still birth, respiratory disease, environmental stress, congenital deformity, savaging, predator. Piglets mortality due to unknown cause contributed 9.86%. Neonatal mortality are associated with cold temperature, low birth weight, crushing and diarrhoea (English and Morrison., 1984) [8] supported this study. All the causes responsible for pre weaning mortality in piglets found in this study presented in the table no-1. Based on this studies, its was found that different factor is responsible for pre-weaning mortality in pig rearing practices under Dhalai District of Tripura and these factors mainly categorized in to five types sow factors, piglets factor, Environment factors, Management factor and unknown factor which is presented in the table no 2. In this study, management factors found to be leading factors responsible

for major loss of piglets before weaning.

Crushing contributed 26.83% mortality in adopted pig rearing practices under Dhalai district of Tripura, India. Poor shed, lack of scientific knowledge on pig rearing and management of newborn piglets is responsible for crushing death found in this study. Sow factor like Litter size, Milk production, Weight of sow, Parity, Responses to piglets is related to crushing death. The crushing death to piglets (Fig 4) mainly observed in first 3 days after farrowing is 71.87%. The crushing death was observed more in winter season and more to the smaller size piglet. Larger litter size has more crushing death compare to small litter size (<6 piglet/litter).

Crushing mortality seen more in the cross breed and exotic breed then local breed of pig as local bred is smaller in body weight and very quick to piglets distress call if lay over on piglets. In general the newborn piglets lower critical temperature is 34 °C and when ambient temperature is below 34 °C piglets will attempt to gain heat shivering and huddling as newborn piglets are so sensitive to cold is that they lack brown adipose tissue and poorly insulated. So, newly born piglets are very sensitive to cold stress due to incomplete thermo regulation at birth to first few days after birth and have a high attraction to the dams udder during (Fig 6) the first three days after birth. The dam's belly area is an excellent source of heat for the newborn piglets and when piglets lay close to that area may easily become crushed (Lay, 2002) [14] and at low ambient temperature piglets are at more risk to be crushed by the sow (Shankar *et al.*, 2009) [20]. Poor body weight, lethargic, weak, starved piglets are more prone to be crushed found in this studies. Crushing generally occurred more at night time then day time during animal laying down from sitting or standing to allow piglets to suck milk. Piglets starvation-hypothermia and crushing is interrelated and complex (Edwards., 2002) [6]. In this complex where piglets factor like vitality and body weight along with sow factor like poor maternal behaviour and environment factor of low ambient temperature is responsible for crushing death.

In addition, starvation and weakness is an important causes of death found in the study and it contributed 16.14% mortality. Piglets suffering from hypothermia are lethargic and weak vitality in nature are more prone to starvation and weakness. Under study it found that majority small holder pig rarer (<2 sow) maintaining their sow with kitchen waste along with locally available feed materials and thus majority sows suffering from nutritional deficiency that lead to inadequate milk production by sow to meet the need of piglets ultimately leading to piglets starvation. It was observed, the competition with stronger and bigger piglets in the litter is an important factor configuring to piglet death by starvation and weakness that supported by English and Smith (1975) [7] finding that as litter size increases there is more competition for the available milk supply, resulting more death in smaller piglets in the litter. So, piglets vitality and body weight after birth is an important determining factor for piglets survival before weaning.

In this study found that Diarrhoea contributed 11.95% mortality and third leading cause of preweaning mortality. Diarrhoea mainly found in the age group of 16 to 30 days. As majority pig rearing is practice without proper drainage on mud (Das *et al.*, 2018) [3] or concrete floor without slope or raised from ground there is lodge of faces, urine, leftover feed, water in the shed. This lodge feed material, faces, water is a favourable condition for bacterial growth. When piglets are hungry and sometime consume this leftover feed along with the contaminated items from the floor may be one of the leading cause of diarrhoea in piglets (Fig 5).

Still birth related to disease condition was not studied but complete loss of total litter due to stillbirth was found during study (fig -1). Stillbirth mortality recorded 10.28% and these stillbirths occur either antipartum or during parturition (intrapartum) supported the finding of Bille *et al.* (1974) [1]. Stillbirth was more in larger litter size and more common in fatty old age sows. Dystokia is also important and proper monitoring is important to prevent stillbirth found in the study. Sows that have prolonged farrowing have a higher number of stillbirths although the number was very less in the field condition.

Pre weaning mortality due to respiratory diseases was recorded 6.91%. Respiratory diseases was characterized by the present of nasal discharge, sneezing, coughing mainly and death was more in the age group between 31 to 45 days which contributed 51.51%. The causes of respiratory diseases was not studied but it was more in the farm which was more unhygienic and poor housing system.

Environmental stress factors mainly ambient temperature was considered. Due to environmental stress 5.46% mortality was recorded. The smaller piglets which are weak and starved generally suffer more from cold stress. High environmental temperature lead to heat stress and also decrease the feed intake of lactating sows (Li *et al.*, 2010) [15] as sows have a thermoneutral zone ranging from 18 °C to 20 °C (Silva *et al.*, 2009) [21]. Thus, heat stress compromises colostrum and milk production in lactating sows and piglets growth performance (Farmer and Quesnel, 2009, Malmkvist, 2012) [9, 17] due to insufficient milk consumed by piglets. In general, due to poor thermo regulation system, newborn piglets are extensively sensitive to cold stress during first days of birth and cold stress is very important for newborn piglets (Shankar *et al.*, 2009) [20]. Newborn piglets don't have adipose tissue, a type of fat that enables newborn animals to generate a great deal of heat to maintain body temperature-unlike many mammals (Lay., 2002) [14] and birth is the challenge to adapt to the thermal environment unable to produce heat to deal with cold environmental temperature and become susceptible to cold

shock (Fig 3). Pig deep body temperature is 39 °C and piglets lower critical temperature is 34 °C (English and Morrison, 1984) [8] so environmental temperature below 34 °C is giving hard time to piglets for maintaining their body temperature. So, cold stress is the important stressors in piglets production. Piglets mortality was more in winter season (43.2%) than other season in the present study and same was reported by several workers (Dial *et al.*, 1992; Maderbacher *et al.*, 1993) [4, 16] that PWM was highest in the cold season because of a low ambient temperature and cold stress. Pre weaning mortality due to savaging was recorded 5.03% and sows that aggressively behave towards the farmer and newborn piglets was 4%. Savaging was more in gilts or at first farrowing than older sow. Savaging was more common in the local breed (Fig 2) than the crossbred. During study it also found that savaging is more in malnourished sows than well nourished and managed sows. Marchant *et al.* (2000) [18] found that savaging sows are more fearful of human interaction. But in this study, the main cause of savaging remains unclear. Savaging activity of sows also injured some piglets in the litters.

Mortality due to congenital abnormality was 5.03% and the main abnormality found was atresia ani, splay leg, deformed limb and blind eye. Congenital abnormality was more in the farm where inbreeding was more but the true reasons was uncertain in this study.

Mortality causes by predator (*i.e.* Dogs, Crow, Wild animals etc) also observed as there are no proper housing and protection wall in many farms to protect the piglets in adopted pig rearing practices in Tripura (Das *et al.*, 2018) [3]. It contribute 2.51% piglets losses before weaning and proper housing can prevent this loss.

About 9.86% mortality was recorded during the study which cause was not able to identify and this were kept under the unknown cause of mortality. For proper identification of this unknown cause mortality elaborated and proper diagnosis technique including molecular technique is necessary in future.

**Table 1:** Major causes of Pre weaning Piglets Mortality found during study in Pig Rearing Practices under Dhalai District of Tripura

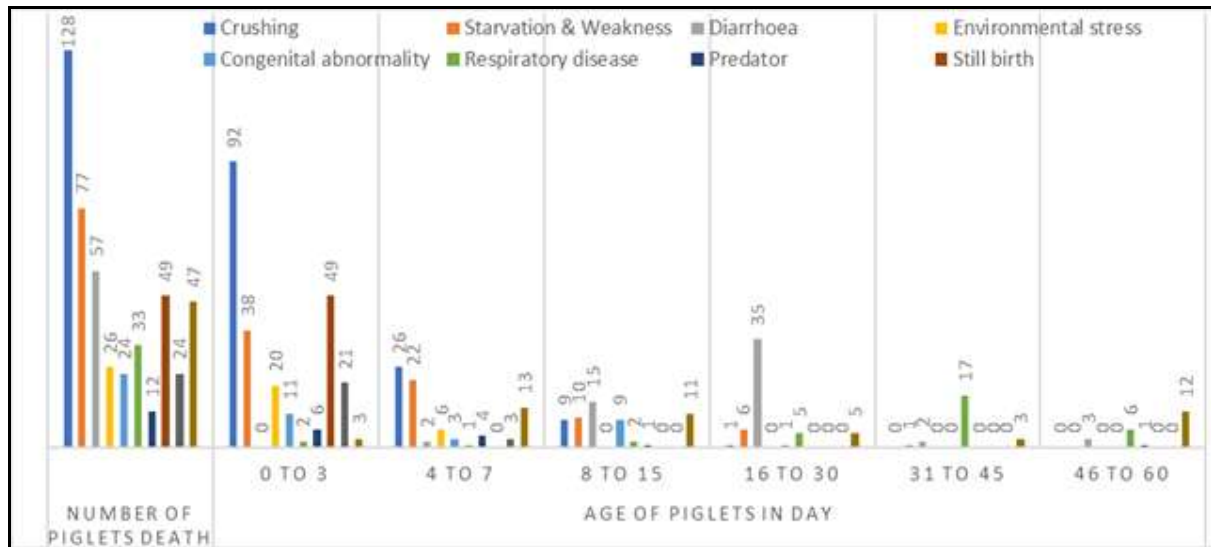
Major Causes	Number of piglets death	Percentage (%)	Age of piglets (day) with death no.					
			0-3	4-7	8-15	16-30	31-45	46-60
Crushing	128	26.83	92	26	9	1	0	0
Starvation and Weakness	77	16.14	38	22	10	6	1	0
Diarrhoea	57	11.95	0	2	15	35	2	3
Environmental stress	26	5.46	20	6	0	0	0	0
Congenital abnormality	24	5.03	11	3	9	1	0	0
Respiratory disease	33	6.91	2	1	2	5	17	6
Predator	12	2.51	6	4	1	0	0	1
Still birth	49	10.28	49	0	0	0	0	0
Savaging	24	5.03	21	3	0	0	0	0
Unknown cause	47	9.86	3	13	11	5	3	12
Total number	477		242	80	57	53	23	22
Percentage (%)			50.73	16.78	11.95	11.11	4.82	4.61

**Table 2:** Factor affecting pre weaning piglets mortality found during observation of the study in Pig Rearing Practices under Dhalai District of Tripura

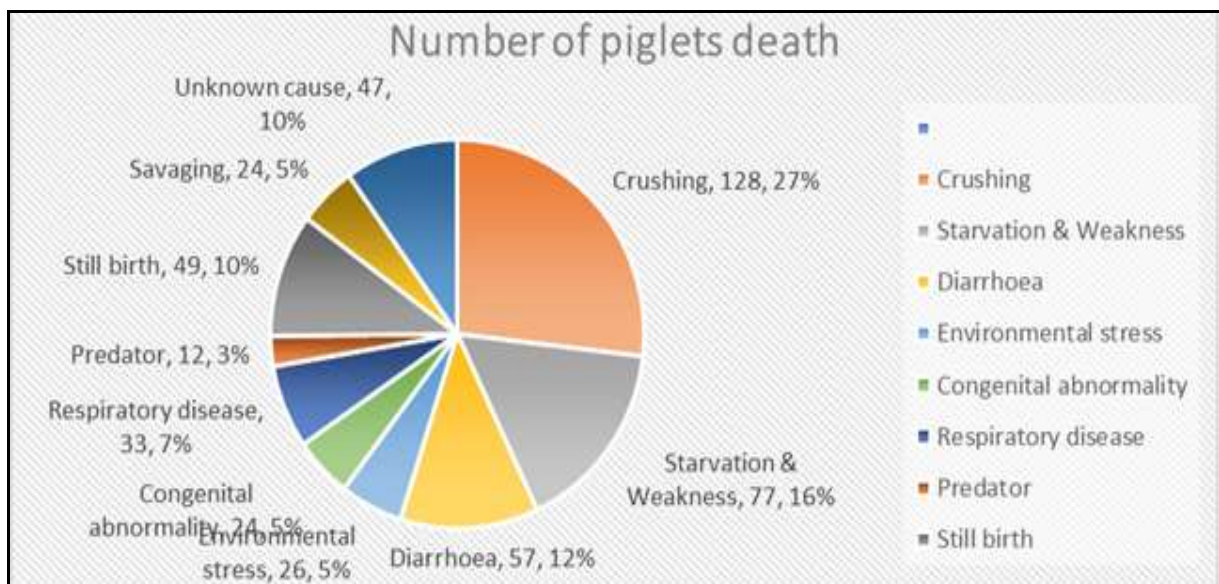
Factors category	Factors observed and identified during study	Major Causes of piglets death
Sow factors	Litter size, Milk production, Weight of sow, Parity, Responses to piglets,	Crushing, starvation
	Not studied but Inbreeding and infections	Congenital abnormality
Piglets factors	Piglets body weight, Piglets viability, Sex	Starvation and Weakness
Environmental factors	Seasons, heat stress and cold stress	Environment stress, Crushing
Management factors	Poor shed construction, contaminated water, Non cleaning of shed regularly	Respiratory disease, Diarrhoea, Predator, Still birth, Savaging, Crushing
	Presence of wild animals and poor construction of shed	
	Not studied but diseases may be responsible	
	Farrowing number, breed, nutrition	
Unknown factors	Non use of bedding materials (straw, jute bag etc).	Unknown causes
	Not able to identify	



**Fig 1:** Still birth piglets; **Fig 2:** Piglets death due to savaging, **Fig 3:** Piglets suffering of cold shock and heat is providing by electricity bulb; **Fig 4:** Piglets suffering of diarrhoea, **Fig 5:** Piglets death due to crushing; **Fig 6:** A newborn day old litter hurdle together near udder area of sow.



**Fig 7:** Numbers of pre weaning piglet mortality in different age groups along with causes of mortality.



**Fig 8:** Piglets mortality numbers and causes wise contribution.

#### 4. Conclusion

Profitability of the pig farming largely depends on the piglets production in terms of piglets survival from birth to weaning as major piglets mortality occur within that period. Low pre weaning piglet mortality is very important for better economical returns. Precautionary measures should be adopted to reduce the pig mortality. During study multiple factors and causes were found responsible for pre weaning piglets mortality in pig production system adopted by local pig producer under Dhalai district of Tripura, India. The factors responsible for piglets mortality is complex and interactions of sow, piglet and environment factors. Proper management strategies adaptation by pig farmers and more extension activity related to pig farming is important to reduce piglet mortality. This study also suggest that proper farrowing pen, pig shed construction, scientific knowledge on pig rearing practice and proper nursing of newborn can reduce the pre weaning piglets mortality greatly in that study area.

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