

# Pattern of mortality of crossbred pigs in an organized swine production farm

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## Abstract

Mortality records of crossbred pigs in an experimental swine production farm, reared under Indian tropical climatic conditions, were collected for the period of last ten years (2000-2010) and effect of age and cause on pattern of mortality was investigated. Results of the present study revealed an overall mortality of 12.18% in entire study period. The average pre-weaning mortality in last ten years was 23.16%. The highest mortality (21.69%) was noted in 0-15 day's age group, whereas, lowest mortality (1.28 %) was observed in 30-45 days age group. Overall mortality in post-weaning stage (46-240 days) and adult animals (above 240 days) were 3.86 % and 2.60 %, respectively. The year wise results exhibited lowest mortality (4.06%) in 2003-2004 and highest mortality (17.78%) in 2009-2010. As regards to cause of death, digestive disorders (2.81%) were principal cause of death followed by hypoglycemia/ weakling, miscellaneous disorders (1.99 %), trauma (1.15 %) and respiratory disorders (0.99 %). This study indicated a scope of further improvement in health status of the animals in the farm during pre-weaning stage, especially at 0-15 day's age of animals.

**Key words:** Age, Cause, Crossbred pigs, Mortality pattern

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## Introduction

Pig rearing plays an important role for improvement of socio-economic condition poor farmers in India and other developing countries. The swine industry in India, currently in its infancy, is in the hands of people having little or no awareness about pig diseases. Swine mortality is an important factor affecting the economic viability and profitability of swine industry. The profitability of swine farm largely depends on the survival of piglets/ litters up to weaning besides other closely related factors such as litter size and weight of piglets at birth. The overall mortality as well as morbidity of pigs depends on pre weaning care, management, and litter size, weight of litter, age season and effective health care. Causes may be multifactorial, including less acceptability of pork in the region, lack of awareness among the farmers and pig raisers regarding management practices, disease prevention and control measures, and above all, a high incidence of fatal diseases.

The mortality pattern and occurrence of different diseases and disorders may also vary with different genetic groups of pigs (Gupta *et al.*, 2001; Nandakumar *et al.*, 2004). Not all the factors associated with mortality can be controlled, but understanding them will assist the farmers and producers in minimizing death loss (Holyoake *et al.*, 1995). Mortality pattern in organized swine herd serves as a useful indicator for assessing the status of herd health and management programme and their efficacy. The first and foremost target of an ideal farm is to reduce the morbidity and mortality rate. Often, there is considerable loss due to the seasonal and routine changes in management, which could be avoided by adopting standard management practices and avoiding unnecessary and abrupt changes in the routine management activities. Retrospective study on mortality may play a role in forecasting the future occurrence of disease in a particular geographical area (Basumatary *et al.*, 2010). Although only few studies have been conducted in scattered way on mortality incidence of pigs, however, no such literatures are available on pattern of mortality in a whole organized swine herd under tropical Indian conditions.

The present study, therefore, was undertaken to document the mortality pattern of crossbred pigs in an experimental swine production farm.

## Materials and methods

The investigation was conducted in the Institute's swine production farm (28°24'N and 79°26'E). The crossbred variety of Landrace pigs with 62.5 and 81.25% exotic inheritance was utilized for the study. A total number of 6330 crossbred pigs belonging to different age groups were maintained in the pig farm during the 10 years period (2000–2010). The institute maintains the elite herd of pigs for research, standardization of management practices for the benefit of researchers, pig farming professionals and farmers. All the animals were maintained under standard management conditions. The pigs were housed in concrete pig sties constructed as per the standard space requirements. The pigs were fed with concentrate feed comprised of maize (35 parts), wheat bran (47 parts), deoiled soya bean cake (10 parts), fish meal (6 parts),

mineral mixture (1.5 parts) and salt (0.5 parts). The piglets were weaned at the age of 45 days. A herd health programme for an organized herd was followed, it involved routine prophylactic and therapeutic measures including treatment of clinical cases, supplementation of multivitamins, vaccinations against foot-and-mouth disease, swine fever and hemorrhagic septicemia, and deworming at regular interval as per the standard recommendations. The pigs that died were necropsied to find out the cause of disease.

Mortality records were collected for the period of last 10 years (2000–2010) and analyzed. Here, sex based analysis was not considered because as a matter of policy, only those males and females piglets that were selected for future breeding were retained in the farm. For the study, the period from birth was divided into 4 different age groups viz., 0– 15 days, 16– 30 days, 31– 45 days, post weaning period (46–240days) and adults (above 240days). Based on the post-mortem findings, the causes of mortality were classified into 10 major classes (digestive, respiratory, cardiovascular, musculoskeletal, toxemia/septicemia, hypoglycemia/weakling, trauma, cannibalism, putrefied/autolysed and miscellaneous conditions). To calculate the percentage of mortality and their distribution pattern, the number of animals died was compared to the average herd strength in the different ages in different years.

## Results and Discussion

A total 771 mortality records out of 6330 total stock of cross bred pigs maintained in swine production farm were analyzed in relation to age and cause of death and presented in table 1-2. The results revealed that an overall mortality of the animals in the farm in last ten years was 12.18%. The overall pre-weaning mortality in last ten years was 23.16%. In pre-weaning stage, highest mortality (21.69%) was noted in 0-15 day's age group, whereas, lowest mortality (1.28 %) was observed in 30-45 days age group. However, overall mortality in post weaning and adult animals was 3.86 % and 2.60 % respectively (Table 1). The cause-wise mortality in different years of study period is shown in table 2. Among the different causes, mortality caused by digestive disorders accounted (2.81%) to the highest mortality than other causes. The second highest mortality of 2.35% was caused by hypoglycemia and weakling. The miscellaneous disorders (1.99 %), trauma (1.15 %) and respiratory disorders (0.99 %) were the third, fourth and fifth most important cause of mortality in crossbred pig (Table 2).

Swine production plays an important role to improve the livelihood of rural people in India. Sustainable pig production in tropical country like India is possible if mortality of pigs from farrowing to marketable age is checked efficiently. For optimum pig production, understanding of cause of death, standard management practices, proper health care and disease prevention are earnest need in organized swine herd. In this study, effect of age and various disease conditions and cause of death on mortality pattern in crossbred pigs were investigated taking account ten years data. The results of age-wise mortality revealed the highest mortality (21.69 %) in pigs of 0-15 day's age group and lowest mortality (1.28 %) in 30-45 days age group in pre weaning stage. The overall pre weaning mortality in crossbred pigs was 23.16%. However, mortality in post weaning and adult animals was 3.86% and 2.60 % respectively. The overall mortality taking all age groups was 12.18%. More than 50 per cent mortality of pigs has been reported during the first four days after birth and the first 24 hours are when the piglets are most

**Table 1. Age-wise mortality in crossbred pigs in different years**

Year	Age group						
	0-15 days	16-30 days	30-45 days	Total pre-weaning	Post-weaning	Adults	Total
<b>2000-2001</b>	13.22 (28)	2.43 (4)	3.12 (5)	19.57 (37)	3.94 (11)	3.79 (3)	<b>9.32 (51)</b>
<b>2001-2002</b>	29.87(72)	1.18 (2)	0.59 (1)	31.12 (75)	0.00 (0)	5.66 (3)	<b>17.76 (78)</b>
<b>2002-2003</b>	12.40 (17)	0.00 (0)	0.00 (0)	7.08 (17)	2.54 (6)	3.58 (12)	<b>4.06 (35)</b>
<b>2003-2004</b>	16.12 (69)	4.62 (11)	1.76 (4)	19.62 (84)	3.66 (12)	11.42 (4)	<b>12.65 (100)</b>
<b>2004-2005</b>	33.21 (97)	2.58 (8)	0.64 (2)	25.90 (107)	3.92 (12)	0.60 (2)	<b>11.54 (121)</b>
<b>2005-2006</b>	22.22 (4)	4.76 (1)	3.75 (3)	6.72 (8)	50.00 (13)	1.08 (1)	<b>9.28 (22)</b>
<b>2006-2007</b>	16.58 (34)	1.75 (3)	0.00 (0)	18.04 (37)	1.71 (3)	0.00 (0)	<b>8.17 (40)</b>
<b>2007-2008</b>	24.31 (106)	1.51 (5)	0.44 (1)	25.68 (112)	0.00 (0)	0.00 (0)	<b>17.07 (112)</b>
<b>2008-2009</b>	38.40 (106)	2.94 (5)	1.81 (3)	41.30 (114)	1.28 (5)	3.29 (3)	<b>16.11 (122)</b>
<b>2009-2010</b>	24.43 (54)	4.19 (6)	1.05 (1)	22.76 (61)	17.74 (22)	6.14 (7)	<b>17.78 (90)</b>
<b>Overall</b>	<b>21.69 (587)</b>	<b>2.44 (45)</b>	<b>1.28 (20)</b>	<b>23.16 (652)</b>	<b>3.86 (84)</b>	<b>2.60 (35)</b>	<b>12.18 (771)</b>

**Table 2. Cause-wise mortality in different breeds of pigs**

Cause/ Disorders	Year-wise mortality										
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Total
Respiratory	1.09 (6)	0.91(40)	0(0)	1.64(13)	1.14(12)	0.84(2)	0.61(3)	1.21(8)	1.45(11)	0.79(4)	0.99(63)
Digestive	2.01(11)	2.05(9)	0.23(2)	2.02(16)	2.48(26)	2.53(6)	1.22(6)	1.52(10)	11.75(89)	0.59(3)	2.81(178)
Musculo-skeletal	0 (0)	0(0)	0.11 (1)	0 (0)	0 (0)	0(0)	0.20(1)	0(0)	0 (0)	0 (0)	0.03(2)
Cardiovascular	0 (0)	0 (0)	0 (0)	0 (0)	0.19 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0.19 (1)	0.04 (3)
Infectious	0.18 (1)	0 (0)	0 (0)	0.12(1)	0.09(1)	1.68(4)	0 (0)	1.06(7)	0 (0)	4.34(22)	0.56(36)
Toxemia/septicemia	1.09(6)	0.22(1)	0.34(3)	1.51(12)	0.09(1)	0(0)	0.40(2)	0.15(1)	0(0)	0.98(5)	0.48(31)
Hypoglycemia/weakling/debility	1.27 (7)	2.27 (10)	1.27 (11)	1.26 (10)	6.29 (66)	1.26 (3)	1.63 (8)	1.67 (11)	0 (0)	4.54 (23)	2.35 (149)
Trauma	1.82(10)	3.64(16)	0.34(3)	1.51(12)	0.57(6)	0.42(1)	1.63(8)	1.98(13)	0.39(3)	0.19(1)	1.15(73)
Scavenging by dam/cannibalism	0.36(2)	6.83(30)	0(0)	1.89(15)	0(0)	0(0)	0(0)	0(0)	0(0)	1.77(9)	0.88(56)
Putrefied/autolysed	0.73(4)	0.68(3)	0.58(5)	1.77(14)	0(0)	0.84(2)	0.40(2)	2.89(19)	0.66(5)	0.98(5)	0.93(59)
Miscellaneous	0.73(4)	1.13(5)	1.16(10)	0.88(7)	0.66(7)	1.68(4)	2.04(10)	6.55(43)	1.84(14)	4.34(22)	1.99(126)
Overall	9.32(51)	17.76(78)	4.06(35)	12.65(100)	11.54(121)	9.28 (22)	8.17(40)	17.07(112)	16.11(122)	17.78(90)	12.18(771)

vulnerable (Edwards and Malkin, 1986; Marchent *et al.*, 2000). Gupta *et al.* (2001) reported highest mortality during first month following birth in indigenous and crossbred pigs under tropical climatic conditions in India. Similarly, Wabacha *et al.* (2004) also observed higher mortality rate in pigs up to 2 months age (18.7%) in smallholder production system in Kenya. Nandakumar *et al.* (2004) observed 31.36% and 10.49% pre weaning mortality in indigenous pigs and crossbred pigs (indigenous × large white Yorkshire) under tropical conditions in India. Yedukondalu *et al.* (2004) reported that mortality in pre-weaning piglets was high (59.76%) during 0-14 days of age. Dutta and Rahman (2006) observed overall preweaning mortality 30.62% in an organized swine farm. They also further recorded the highest incidence of mortality (46.70-47.84%) in Hampshire crossbred pigs. Many workers reported that traumatic injury from overlaying of dam, starvation, inanition and parturient psychosis are main causes of death of piglets in their first week of age (Dunne and Lehman, 1978; Dutta and Rahman, 2006). Apart from this, a direct relationship exists between litter size and mortality rate of piglets (Ramesh, 2011). Traumatic injury and inanition are frequently associated with larger litter size. The healthy, active and stronger piglets often overtake the comparatively weaker piglets of same litter in terms of suckling milk from dam. The fighting among littermates often causes injury and ultimately lead to death of a large number of piglets. In our study, average litter size at birth was recorded to be  $9.97 \pm 0.56$  (unpublished data). In spite of large litter size, the average mortality was 21.69 % in pigs of 0-15 day's age group and overall pre weaning mortality was 23.16% which is comparatively less than the other organized Indian farms. It might be due to adoption of good management practices like strict hygiene, colostrums feeding, protection from inclement weather (extreme cold/hot), naval dipping, provision of iron injection, good stockman ship round the clock, proper medication and prompt health care activities.

In the present investigation, average post weaning and adult mortality of pigs were 3.86% and 2.60% respectively, it was significantly less than pre weaning mortality. Similar findings are also reported by Basumatary *et al.* (2009) who recorded highest mortality in pigs 0-2 months (pre weaning) age group and lowest mortality among 8 months and above age group. The decline of mortality from birth to post weaning could be due to improper development of body's immune system at very early stage which later on gradually develops and defend against various diseases.

As regard to cause wise mortality, digestive disorders were the major cause of mortality in crossbred pigs. Similar finding is also recorded by other workers who reported gastrointestinal disorders were the major cause of pig mortality in various swine farms in Indian condition (Nath *et al.*, 2001; Yedukondalu *et al.*, 2004; Basumatary *et al.*, 2009). Hypoglycemia, weakling and debility conditions ranked as second highest mortality in the present study. This may be well explained by the fact that higher litter size of crossbred pigs where comparatively weak piglets become deprived from stronger piglets for optimum suckling of dam's milk. Improper suckling of milk for first few days of life lead to inanition, hypoglycemia and debility. Nath *et al.* (2001) observed 13.47% mortality due to weakness, debility and inanition. Miscellaneous disorders were the third most important cause of mortality. The conditions like crushing, hypothermia and stillbirth etc were included in this category. Accidental crushing by sow is reported to be most common cause of death (Edwards and Malkin, 1986) and experimental works

indicate the proportion of deaths attributable to crushing is influenced greatly by the design of farrowing accommodation and the viability of piglets (O'Reilly *et al.* 2006; Milligan *et al.*, 2002). Similar findings were observed by Basumatary *et al.* (2009) who reported that miscellaneous disorders caused second highest mortality in swine production farm of north eastern India. After farrowing, piglets from higher litter size are prone to crushing from heavy weight dam during frequent movement in close confined crates. Various workers also reported that starvation and crushing are the major causes (75-80%) of pre weaning death (Radostits *et al.*, 2000; Edwards, 2002). Therefore, providing standard farrowing crates, round the clock monitoring (stockman) and manual assistance to the weak piglets to suckle dam's milk might be helpful to minimize the pre weaning mortality. Though substantial percentage of mortality (0.99%) was also caused by respiratory disorders, however, it was significantly less as compared to other causes mentioned above. This result is contradictory to the findings of Nath *et al.* (2001) and Basumatary *et al.*, 2009, 2010). In our farm, two farrowing are taken annually during March-April and September-October. It seems that low mortality from respiratory disorders could be due to favorable climatic condition during farrowing time.

From the present study, it can be concluded that overall mortality of crossbred pigs was 12.18%. The overall pre weaning mortality of pigs was 23.16% in which maximum mortality (21.69%) was noted in 0-15 day's age group. Among the cause wise mortality, gastrointestinal disorders was the principal cause of death followed by hypoglycemia/debility, miscellaneous and respiratory disorders.

## References

- 1) Basumatary, R., S. Naskar, A. Kumaresan, G. Khargharia, G. Kadirvel and R. K. Bardoloi, 2009. Analysis of mortality pattern among indigenous and upgraded pigs under subtropical hill agro climatic conditions in eastern Himalayas. *Livestock Sci.*, 123: 169–174.
- 2) Basumatary, R., S. Naskar, A. Kumaresan, G. Khargharia, G. Kadirvel, and R. K. Bardoloi, 2010. Mortality in pigs under subtropical hill conditions of Meghalaya. *Indian Vet. J.*, 87: 824-825.
- 3) Dunne, H. W. and A. D. Lehman, 1978. *Diseases of swine*, 4<sup>th</sup> Edn. Iowa State University Press, Iowa, USA.
- 4) Dutta, B. and T. Rahman, 2006. Epidemiological studies on the preweaning mortality of piglets in the organized farms of Assam. *Indian Vet. J.*, 83: 376-378.
- 5) Edwards, S. A. and S. J. Malkin, 1986. An analysis of piglet mortality with behavioural observations. *Animal Prod.*, 42: 470.
- 6) Edwards, S. A. 2002. Perinatal mortality in the pig: environmental or physiological solutions? *Livestock Prod. Sci.*, 78: 3–12.
- 7) Gupta, R. K., V. P. Singh, and V. P. Belsare, 2001. Growth pattern and mortality in pre-weaning crossbred pigs. *Indian J. Anim. Res.*, 35: 96–99.
- 8) Holyoake, P. K., G. D. Dial, T. Trigg, and V. L. King, 1995. Reducing pig mortality through supervision during the perinatal period. *J. Anim. Sci.*, 73: 3543–3551.

- 9) Marchent, J. N., A. R. Rudd, M. T. Mendle, D. M. Broom, M. J. Meredith, S. Corning, and P. H. Simmins, 2000. Timing and cuses of piglet mortality in alternative and conventional farrowing systems. *Vet. Rec.*, 147: 209-214.
- 10) Milligan, B. N., C. E. Dewey, and A. F. De Grau, 2002. Neonatal-piglet weight variation and its relation to preweaning mortality and weight gain on commercial farms. *Prev. Vet. Med.*, 56: 119-127.
- 11) Nandakumar, P., M. R. Rajan, P. Gangadharan, B. H. Savitha, V. R. Mathews, and L. Jeeva, 2004. Litter traits and mortality among desi, Large White Yorkshire and their crosses under intensive production systems. *Indian J. Anim. Sc.*, 74: 447–449.
- 12) Radostits, O. M., C. C. Gay, D. C. Blood, and K. W. Hinchcliff, 2000. *Veterinary Medicine: A Text Book of the Diseases of Cattle, Sheep, Pigs, Goats and Horses*, 9th Edn. W.B. Saunders Company Ltd., London.
- 13) Nath, D. R., D. Deka, S. Saikia, and D. C. Mili, 2001. Studies on pre weaning mortality of piglets in an organized farm. *Indian J. Anim. Health*, 40: 133-136.
- 14) O'Reilly, K. M., M. J. Harris, M. Mendl, S. Held, C. Moinard, P. Statham, J. Marchant-Forde, and L. E. Green, 2006. Factors associated with preweaning mortality on commercial pig farms in England and Wales. *Vet. Rec.*, 159: 193-196.
- 15) Ramesh, R.T., 2011. Mortality pattern in pigs based on postmortem examination. *Indian J. Vet. Med.*, 31:40-41.
- 16) Wabacha, J. K., J. M. Maribei, C. M. Mulei, M. N. Kyule, K. H. Zessin, and W. O. Kosura, 2004. Health and production measures for smallholder pig production in Kikuyu division, central Kenya. *Prev. Vet. Med.*, 63: 197–210.
- 17) Yedukondalu, R., D. S. Rao, and A. Ravi, 2004. An analysis of mortality in crossbred pigs. *Indian Vet. J.*, 81: 1171–1173.