

## STUDIES ON RISK FACTORS OF MORTALITY IN LAMBS IN SOKOTO, NIGERIA.

AHMED<sup>1</sup>, A., EGWU<sup>2</sup>, G. O., GARBA<sup>3</sup>, H. S. and MAGAJI<sup>4</sup>, A. A.

<sup>1</sup>National Veterinary Research Institute, Zonal Research Laboratory, Birnin Kebbi.

<sup>2</sup>Department of Veterinary Pathology and Microbiology;

<sup>3</sup>Department of Medicine, Surgery and Theriogenology;

<sup>4</sup>Department of Public Health and Animal Production, Usmanu Danfodiyo University, Sokoto, Nigeria.

**Correspondence: E-mail: [abdahmed65@gmail.com](mailto:abdahmed65@gmail.com), Tel: +234 08061568106**

### SUMMARY

**Mortality in lambs is complex problem which may result from a variety of climatic, nutritional, management, infectious, genetic and other factors. Associated with death are other factors which could be of maternal or lamb origin that predisposes the young lamb to early death. Records of sex, breed, age, birth weight, type of birth, season of birth and age of ewe from 82 lambs that were dead and posted are recorded and analyzed as the associated risk factors contributing to mortality in these lambs. More male lambs died 49 (59.76%) compared to females 33 (40.24%) whilst mortality in lambs aged 0-7 days was 40 (48.78%). The effect of birth weight showed 47 (57.31%) mortalities in lambs less than 2kg at birth. Higher deaths were seen during the wet season 37 (45.12%) than during cool and hot seasons. Mortality was more in Uda breeds 29 (35.37%) than in other breeds. The outcome of the study showed that the knowledge of when and how mortality occurs could be helpful and to reduce mortality, the management of lambs particularly at early age is imperative.**

---

**Key words: Risk factors, Mortality, Lambs, Sokoto, Nigeria**

### INTRODUCTION

Neonatal mortality is defined as the deaths of lambs occurring within the first few days or weeks of life (Charcani *et al.*, 1991; Lynch, *et al.*, 1992; Neary, 1996, 1997; Sharif *et al.*, 2005) and is the major source of wastage to the sheep industry (Dennis, 1974; Haughey, 1991). ILCA (1980) have indicated that mortality has been established as a major constraint to the productivity of small

ruminants in tropical Africa. The extent of lamb mortality reported from various regions varies between 5 – 70 % but averages 10 – 20 %. Studies in Kenya by Wilson *et al.*, (1985) indicated that up to 20% of lambs are lost by the first month of life. In Asia, Khan *et al.*, (2006) reported the average lamb mortality rate to be between 9 – 12 % in Pakistan while in India, Sharma *et al.*, (1999) reported 21% as the average lamb

mortality rate. The reported average lamb mortality in Australia was between 30 - 35 % depending on the region and breed of sheep. However, under normal conditions, the loss in Australia is 5 - 20% with 80% of such deaths occurring within the first week of life (Moule, 1954). In the United Kingdom, the average lamb mortality averages between 12 - 25% in England, Scotland and the Irish republic (Boundy, 1981; Teagasc, 1991; Egan, 1992; Sawalha *et al.*, 2007). In mountain flocks however, these figures can be higher.

Though sheep contributes significantly to the economy of Nigeria, it is imperative to increase its productive performance to meet the ever increasing demand for animal protein. This can only be achieved by increasing the number of lambs successfully reared per ewe in a given season. Lamb mortality is however, a major dilemma that makes this goal difficult. Reports on the factors affecting lamb mortality in Sokoto state are scanty; therefore the objective of this study was to identify those risk factors contributing to lamb mortality in Sokoto and its environ.

## **MATERIALS AND METHODS**

The study was conducted in Sokoto, the capital of Sokoto State, located in the North Western part of Nigeria. The state lies along longitude 11° 30' to 13° 50' East and latitude 4° to 6° North covering an area of 26,648.48 sq km. There are 23 local local government areas in the state. The climate of the state is semi-arid with two major distinct seasons namely, wet and dry seasons. The wet season starts from late May and ends in September with a mean annual rainfall of between 500mm and 1300mm. Peak rainfall is reached in

August. Dry season starts from October with the cold, dry, dust laden harmattan wind lasting till February. Between the months of March to May, the weather is hot and dry with temperatures reaching 38°C - 42°C during the day with relative humidity less than 20%. In terms of vegetation, Sokoto state falls within the Sudano – Sahelian vegetation zone which is suitable for cultivation of grains, cash crops and animal husbandry. The state is a major livestock producer and is estimated to have sheep population of 1,988,629 million (FDLPCS, 2002; MOCIT, 2002).

Ten flocks were randomly selected within Sokoto and environ. The total sheep population in the selected flocks was 684 comprising of 454 (66.37%) females and 230 (33.63%) males of Uda, Balami, Yankasa, Sudanese and their crosses. All the sheep were managed under semi - intensive system. Follow – up visits were made to the flocks every fortnight for a period of one year (November, 2006 to October, 2007) to collect lambs that died during the period. Information on each lamb about age, sex, season, breed, birth weight, type of birth as well as age of ewe were recorded. Eighty two lambs that died or were born dead were picked and transported in an icebox to the postmortem room of the Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto for postmortem. Postmortem was carried out on each lamb according standard procedures described by Taiwo (2005).

## **RESULTS**

A total of 268 lambs were born during the period of the survey out of which 82 died giving a lamb mortality rate of 30.59%. The influence of sex as a factor

of mortality is shown in Table I. More male lambs 49 (59.76%) died compared to females 33 (40.24%). The effect of breed showed that more mortality was recorded in Uda lambs 29 (35.37%) than Balami breeds 19 (23.17%). Amongst

Sudanese breeds the number of death was 17 (20.73%) whilst 10 (12.19%) Yankasa lambs died and 7 (8.54%) lambs of various crosses died (Table II).

**Table 1. Mortality in lambs according to sex in Sokoto environs.**

Sex	Born (%)	Dead (%)
Male	124(46.3)	49 (59.76)
Female	144(53.7)	33 (40.24)
<b>Total</b>	<b>268</b> (100.0)	<b>82</b> (100.0)

Figures in parenthesis are percentages of observed mortalities  
No significant difference between males and females (P>0.05)

**Table II: Breed specific prevalence of mortality in lambs and their sex distribution in Sokoto environs.**

Breed	Male	Female	Total
Yankasa	6 (60.0)	4 (40.0)	10 (12.19) <sup>b</sup>
Udah	16 (55.17)	13 (44.83)	29 (35.37) <sup>a</sup>
Balami	13 (68.42)	6 (31.58)	19 (23.17) <sup>b</sup>
Sudanese	12 (70.59)	5 (29.41)	17 (20.73) <sup>b</sup>
Crosses	2 (28.57)	5 (71.43)	7 (8.54)

Figures in parenthesis are percentages of observed mortalities. Values denoted by different superscripts vary significantly (P<0.05)

On the basis of age as a factor of mortality, 40 (48.78%) lambs aged 0-7 days died compared to 17 (17.07%) lambs aged 8-15 days and the difference was significant (P<0.05). Nine (10.97%) lambs of age 22-28 died whilst mortality among lambs aged 29-35 days was 8 (9.76%). Two lambs (2.44%) aged above 35 days died (Table III). The influence of type of birth on lamb mortality is summarized in Table IV. Thirty six

(43.90%), 28 (34.15%) and 18 (21.95%) of singletons, twins and triplet lambs respectively died. The effect of season of birth on mortality is presented in Table V. In the rainy season, 37 (45.12%) mortalities were recorded whilst 24 (29.27%) and 21 (25.61%) mortalities were recorded during cool and hot seasons respectively.

Table VI shows the effect of birth weight as a risk factor on mortality. Overall, 47 (57.31%) lambs weighing less than 2kg died ( $P < 0.05$ ). Mortality in lambs that weigh 2.5 - 3kg was 7 (8.54%) whilst 9 (10.98%) lambs of weight 3.5 - 4 kg died. Mortality amongst lambs of weight 4.5 – 5kg was 14 (17.07%). Five (6.10%) lambs of

weight greater 5kg also died during the survey. The age of ewe as a contributing factor to mortality in lambs is shown in Table VII. Thirty nine (22.67%) out of 172 lambs born of adult ewes aged ( $> 2$  years) and above died whilst 43 (44.79%) out of 96 lambs that were born from ewe lambs aged ( $< 2$  years) died.

**Table III: Frequency of lamb mortality based on age and their sex distribution in Sokoto environs.**

Age (days)	Number males	Number of females	Total
< 1	8 (61.54)	5 (38.46)	13(15.85) <sup>b</sup>
1-7	17 (62.96)	10 (37.04)	27(32.93) <sup>a</sup>
8-14	8 (57.14)	6 (42.86)	14(17.07) <sup>b</sup>
15-21	5 (55.55)	4 (44.45)	9(10.97) <sup>b</sup>
22-28	6 (66.67)	3 (33.33)	9 (10.97) <sup>b</sup>
29-35	3 (37.5)	5 (62.5)	8 (9.76) <sup>b</sup>
>35 days	2 (100.0)	0 (0.0)	2 (2.44) <sup>b</sup>
<b>Total</b>	<b>49</b>	<b>33</b>	<b>82(100.0)</b>

Figures in parenthesis are percentages of observed mortalities  
 Values denoted with different superscripts for age group vary significantly ( $P < 0.05$ ).

**Table IV: Effect of single or multiple births on mortality in lambs in Sokoto environ.**

Birth type	No. lambded	No. dead	% Mortality
Single	135	36 (26.67)	43.90
Twins	98	28 (28.57)	34.15
Triplets	35	18 (51.42)	21.95
Quadruplets	0	0	0
<b>Total</b>	<b>268</b>	<b>82</b>	<b>100.0</b>

Figures in parenthesis are percentages of observed mortalities from lambs born.

**Table V: Seasonal distribution of mortality in lambs in Sokoto environs.**

Season	Male	Female	Total
Cool dry	13	11	24 (29.27) <sup>c</sup>
Hot dry	12	9	21 (25.61) <sup>b</sup>
Rainy	24	13	37 (45.12) <sup>a</sup>
<b>Total</b>	<b>49</b>	<b>33</b>	<b>82 (100.0)</b>

Figures in parenthesis are percentages of observed mortalities  
 Values with different superscripts for given season are significantly different (P=0.05; P < 0.05)

**Table VI: Mortality in lambs based on birth weight in Sokoto environs.**

Weight (kg)	Number of males	Number of females	Total
0.5-1	9	4	13 (15.85) <sup>b</sup>
1.5-2	20	14	34 (41.46) <sup>a</sup>
2.5-3	6	3	9 (10.98) <sup>b</sup>
3.5-4	3	4	7 (8.54) <sup>c</sup>
4.5-5	8	6	14 (17.07) <sup>b</sup>
> 5	3	2	5 (6.10) <sup>c</sup>
<b>Total</b>	<b>49</b>	<b>33</b>	<b>82 (100.0)</b>

Figures in parenthesis are percentages of observed mortalities. Values for age groups with different superscripts vary significantly P < 0.05).

**Table VII: Effect of age of ewe on mortality in lambs in Sokoto environ.**

Ewe	Total born	Total dead (%)
Primiparous	96	43(44.79)
Pleuriparous*	172	39(22.67)
<b>Total</b>	<b>268</b>	<b>82</b>

\*2 years and above.

## DISCUSSION

More male mortality (59.76%) was observed as against (40.24%) for female lambs in this study. This agrees with the works of Berger (2000) who reported 10.5% for males and 9.5% for females and Turkson (2003) who reported 54.2% for males and 27.6% for females. However, the finding is not in agreement with the of results Turkson and Sualisu, (2005) in Ghana where the rates were higher for females 42.2% as against 16.7% for males. This difference in mortality between the male and female in lambs has been attributed to sex linked determinants which according to Mandal *et al.*, (2007) are yet to be identified. In terms of breed in this study, Uda lambs had the highest mortality (35.37%) compared to Balami (23.17%), Sudanese (20.73%), Yankasa (12.19%) and other crosses (8.54%). This finding contrasts with that of Hassan, (2000) who reported lower values for Uda. The observed difference might be due to the fact that the reported lower values by Hassan (2000) were from research farms where close attention was given to the ewes at lambing as well as the lambs after wards. The higher mortality among Uda breed in this study may be because of the preponderance of Uda breeds in the population.

Radostits *et al.*, (1994) stated that most mortalities in lambs occur within the first few days of life which is a reflection of the transition from a dependent intrauterine life to an independent extra-uterine life. In the present study, 48.78% of mortalities occurred in the first 7 days of life. This was in accordance with the findings of earlier reports by Otesile and Oduye, (1991); Sharif *et al.*, (2005) and Khan *et al.*, (2006) who reported

(67.2%), (62.1%) and (82%) mortalities as occurring in the first week of life respectively. However, the result is not in agreement with 3.6% obtained in Peru, Latin America (Radostits *et al.*, 1994). The difference with Peru was attributable to the excellent management conditions employed under a cooperative system which provided for high level of health care, nutrition, parasite control, range management as well as husbandry among the sheep farmers (Radostits *et al.*, 1994). The high mortality at this age in the present study could be attributed to the nutritional and environmental factors in Sokoto which leads to scarcity of feeds especially during the long dry season. Alternatively, it could be due low temperatures during wet season, as well as low quantity of milk from primiparous ewes which are also prone to mismothering due to inexperience among such ewes.

Mortality in lambs' increases with litter size (birth type), a relationship that is associated with a decline in birth weight as litter increase. In this study, although a higher number of single lambs died, the percentage mortality rate is higher among triplets (51.43%) and twins (28.57%) compared to single (26.67%) lambs. This finding is in agreement with those of Berger (2000) and Shelton and Willingham (2005). The high mortality in twins and triplets may be explained by the facts that they have lower energy balance than singletons (Skalski, 2003). Besides, it also takes the ewe dam a longer time to lick and dry 2 or 3 lambs. Furthermore, the milk requirement of twins or triplets is higher than that of single lambs and starvation is more likely among them leading to starvation and death. The high number of mortality in singletons in the present study may be

because more single lambs were born compared to twins and triplets.

Although the weather in Sokoto is generally ideal for lambing, the mortality rate was higher during the wet season (43.12%). Ahaemaefule *et al.*, (2005) obtained similar result in kids. Mortality during wet season is not uncommon with the inclement weather during the rains. The rains, cool temperatures, wet environment and winds all play a role in exposing the young lambs to hypothermia and pneumonia. The (29.27%) mortality observed during cool dry season could be explained by the effect of the cool, dry and dust laden harmattan winds which predisposes the lambs to respiratory disease and pneumonia. Mortality during the hot season was lower (25.61%) but still represented a quarter of all the mortalities observed in the present study. According to Radostits *et al.*, (1994) mortality during hot season may be due to the two critical needs of shed or shelter and proximity to water to the ewe which may be lacking.

In the present study, (57.31%) of mortality occurred amongst lambs weighing less than 2kg at birth. The result is consistent with those of Aldomy, (1992), Dwyer *et al.*, (2001), Sucic *et al.*, (2005) and Munir *et al.*, (2008). According to Dwyer, (2003) the effect of birth weight is explained by the fact that lambs with lower birth weight are less vigorous, are slower to stand at birth and they suckle less frequently which may lead to starvation resulting in higher deaths.

Berger, (2000) has observed that although the average litter size of ewe

lambs is much lower than of adult ewes, the mortality rate of their lambs is higher. The present study showed that mortality among lambs from ewe lambs was (44.79%). This result agrees with the report of Ojo (2006) in kids. The preponderance of mortality among lambs from ewe lambs may be because dystocia is more common among them (Radostits *et al.*, 1994) and they produce less colostrum and milk (Anon, 2009) or because they have poor maternal instincts and do not take care of their lambs immediately since they are less experienced mothers (Berger, 2000; Dwyer *et al.*, 2001; Anon, 2009).

## **CONCLUSION**

The first week of life of lambs is the most critical from the survival point of view. Special care should be given to lambs during the first week of life particularly lambs with low birth weight either born singly or as twins. The nutritional and health status of ewes especially during late gestation and at lambing should be given close and special attention. Farmers should be made to understand the need for lambs to have adequate colostrum immediately after they are lambed (24 -36 hours critical). The management of 1-7 day-old lambs as well as the prompt diagnosis and treatment of neonatal conditions is imperative.

## **REFERENCES**

- AHAMAEFULE, F.O., IBEAWACHI, J.A. and ONYEKA, C.C. (2005). Incidence of kid mortality in a University Livestock Farm. *Trop. J. Anim. Sci.*, 8 (2): 23-28.

- ALDOMY, F.M.M.A. (1992). A study of perinatal mortality of small ruminants in Jordan. PhD Thesis, Royal Veterinary College, University of London.
- ANON, (2009). Sheep Diseases A - Z. A beginner's guide to raising sheep. <http://www.sheep101.info/201/diseases-z.html>.
- BERGER, Y.M. (2000). Lamb mortality and causes. A nine year summary at the Spooner Agricultural Research Station, Spooner Agricultural Research Station, University of Wisconsin-Madison, US. Pp 33-41.
- BOUNDY, T. (1981). Programming for preventive disease and improved productivity in sheep. *Can. Vet. J.*, **22**: 221-225.
- CHARCANI, B., ROBINSON, R.T., and JOHNSON, D.W. (1991). Lamb mortality in Meknas Province, Morocco. *Prev. Vet. Med.*, **10**: 238-98.
- DENNIS, S.M. (1974). A survey of congenital defects. *Vet. Rec.* **95**: 488.
- DWYER, C.M., LAWRENCE, A.B. and BISHOP, S.C. (2001). The effects of selection for lean tissue content on maternal and neonatal behaviours in Scottish blackface sheep. *Anim. Sci.*, **72**: 1092-1110.
- DWYER, C. M. (2003). Behavioural development in the neonatal lamb: effect of maternal and birth related factors. *Theriogenology*, **59**: 1027-1110.
- EGAN, T. (1992). Prices of lambs in Irish republic. *Farming Independent*, 1-3.
- FDLPCS, (2002). Federal Department of Livestock and Pest Control Services. National livestock Vol. II, National Synthesis, Resource Inventory and Management Ltd, St. Helier, Jersey, JE4 8UD, UK. Pp 287.
- HASSAN, W. A. (2000). Biological productivity of sheep and goats under agro-silvo pastoral systems in Zamfara reserve of north western Nigeria. PhD Thesis, der Justus-Liebig Universitat, GieBen, Germany. Pp 263.
- HAUGHEY, K.C. (1991). Perinatal lamb mortality its investigation, causes and control. *Journal of the South African Veterinary Association*, **62**, 78-91.
- ILCA, (1980). Small ruminant production in tropical Africa. ILCA Bulletin 7. Addis Ababa.
- KHAN, A., SULTAN, M.A., JALVI, M.A. and HUSSAIN, I. (2006). Risk factors of lamb mortality in Pakistan. *Anim. Research*, **55**: 301-311.
- LYNCH, J.J., HINCH, G.N. and ADAMS, D.B. (1992). The behaviour of sheep. In: *Biological principles and implications for production*. CAB International, Australia. 237 pp.
- MANDAL, A., PRASAD, H., KUMAR, A., ROY, R. and SHARMA, N. (2007). Factors associated with lamb mortalities in

- Muzaffarnagari sheep. *Small Rum. Res*, **7 (1:3)**: 273-279.
- MOCIT, (2002). Guide to Sokoto states economic potentials. Commerce dept, Ministry of Commerce, Industry and Tourism, Sokoto state. Pp 4-18.
- MOULE, G. R. (1954). Observations on mortality amongst lambs in Queensland. *Austr. Vet. J.*, **30**: 153-157.
- MUNIR, M., JASRA, A.W. and RAFIQUE, S. (2008). Lamb production under different management on rangelands of Balochistan. *Pak. Vet. J.* **28 (2)**: 68-70.
- NEARY, M. (1996). Increasing lamb survival. *The Wool Sack*, **41 (12)**: 1-5.
- NEARY, M. (1997). Increasing lamb survival. *The Wool Sack*, **46 (8)**: 12-18.
- OJO, S.A. (2006). Studies on prenatal kid mortality in Sokoto red goat. In: Harnessing Livestock Resources in an Emerging Nigerian Economy. (Fasanya, O.O. et al eds). *Proc. of 43<sup>rd</sup> NVMA Annual Congress, Minna, 6<sup>th</sup> -10<sup>th</sup> November*. Pp 170-173.
- OTESILE, E.B. and ODUYE, O.O. (1991). Studies on West African dwarf sheep: Incidence of perinatal vet. pays mortality in Nigeria. *Revue Elev. Med. Trop.*, **44**: 9-14.
- RADOSTITS, O.M., LESLIE, K.E. and FETROW, J. (1994). Herd Health: Food Anim. Prod. Med., 2<sup>nd</sup> ed. WB Sanders Co. pp 527-606.
- SAWALHA, R.M., CONINGTON, J., BROTHERSTONE, S. and VILLANUEVA, B. (2007). Analysis of lamb survival of Scottish Blackface sheep. *Animal*, **1**: 151-157.
- SHARIF, L., OBEIDAT, J. and Al-ANI, F. (2005). Risk factors for lamb and kid mortality in sheep and goat farms in Jordan. *Bulgarian J. of Vet. Med.* **8(2)**: 99-108.
- SHARMA, P. R., BENIWAL, B.K., SINGH, V.K. and DAS, G. (1999). A note on mortality of Nali lambs in arid zone of Rajasthan. *Indian Vet. J.* **76**: 445-447.
- SHELTON, M and WILINGHAM, T. (2005). Lamb mortality. *Sheep and Goat Research Journal*, American Sheep Industry Association. Pp 1-5.
- SKALSKI, J.R. (2003). Survival under proportional hazards. Colombia Basin Research, School of Aquatic and Fishery Sciences, University of Washington, Seattle, USA. Pp 1324-1344.
- SUCIC, V., PAVIC, V., MIOC, B., STOKOVIC, I. and KABALIN, A.E. (2005). Seasonal variation in lamb birth weight and mortality. *Veterinarki arhiv*, **75(5)**: 375-381.
- TAIWO, V. O. (2005). A manual for necropsy procedures for

**Ahmed et al: Risk factors for lamb Mortality**

veterinary medical students and clinicians. Dabfol Print & Pack Limited, Ibadan, Nig. 123pp.

TEAGASC (1991). Cutting losses at lambing. The Irish Agriculture and Food Authority, Dublin, Ireland.

TURKSON, P.K. (2003). Lamb and kid mortality in village flocks in coastal savannah zone of Ghana. *Trop. Anim. Hlth and Prod.*, **35(6)**: 477-490.

TURKSON, P.K. and SUALISU, M. (2005). Risk factors for lamb mortality in sahelian sheep on a breeding station in Ghana. *Trop. Anim. Hlth and Prod.*, **37**: 49-56.

WILSON, R.T., PEACOCK, C.P. and SAYERS, A.R. (1985). Preweaning mortality and productivity indices for goats and sheep on a Masai group ranch in South- Central Kenya. *Anim. Prod.*, **941**: 201-206.