

## NEONATAL MORTALITY OF SMALL RUMINANTS IN JORDAN

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### Summary

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Neonatal mortality occurring within 14 days of birth was recorded in sheep and goats in Jordan during 2000–2001. *Post-mortem* examination of 155 lambs and kids that died in the neonatal period indicated that 120 (77.4%) of lambs' and kids' deaths were due to infectious causes, another seven (4.5%) died of a combination of infectious and non-infectious causes and 18 (11.6%) died because of non-infectious causes. *Post-mortem* examination failed to discover a cause of death in 5 out of the 104 lambs and in 5 out of the 51 kids. The results of the investigation demonstrate that losses in neonates may be due to more than one cause in the same animal.

**Key words:** Jordan, lambs, kids, neonatal mortality

### INTRODUCTION

Neonatal losses include neonatal deaths within 14 days of birth. The aim of the study was to get an accurate knowledge of various causes of small ruminant neonatal mortality.

Prevalence of neonatal deaths in Jordan indicated that losses of kids (13.6%) were higher than in lambs (6.7%) (Aldomy, 1992). Large losses of lambs and kids have long been recognized in Jordan, but little information was available on losses among Awassi lambs and Baladi and Shami goats and their crosses. As it became increasingly evident that the losses during the neonatal period constitute a major source of wastage in small ruminants production, the efforts to reduce losses can be economically rewarding.

Infectious abortions and poor nutrition of ewes and does should be considered

when evaluating neonatal losses, as the numbers of weak and small lambs produced in such circumstances can increase the mortality rate.

The management and climatic conditions are also important, particularly where flocks are managed intensively at lambing, or kept in extreme environmental conditions.

A comparatively minor increase in wind speed, particularly when accompanied by rain and cold, can result in a significant increase in mortality. Therefore, where ewes and does are lambing and kidding outside, special care should be taken to provide adequate shelter and shepherds should ensure that neonates receive adequate colostrum as soon as possible after birth for acquisition of passive immunity and for energy intake.

## MATERIALS AND METHODS

### *Dead lambs and kids*

One hundred and four Awassi lambs and 51 Baladi and Shami kids that did not survive the neonatal period were submitted to the Central Veterinary Laboratories, Amman by owners or collected from farms.

### *Necropsy*

Each lamb and kid was subjected to a standardized necropsy. The case history, date of submission, name and address of owner, sex, the age at time of death was recorded according to the farmers' knowledge.

The condition of the carcass was examined for evidence of autolysis and dehydration. Any external abnormalities were noted. The limbs were manipulated to test for stiffness of joints. The feet were examined for the presence of the membrane covering the volar aspect at birth, absence of the membrane being an evidence that the lambs or kids had walked. The umbilical cord was examined for the extent to which it had dried or become infected. Incisions were made at the head, neck, flank and extremities. The exposed subcutaneous tissues were examined for presence of oedema and degree of hydration.

After completing the external examination, the carcass was laid on its back and was opened by removing the skin of the ventral aspect of the neck caudally. The thyroid gland, cervical thymus and trachea were then examined. The sternum was removed caudally by cutting through the costo-chondral junctions. Any abnormalities in the pleural cavity were noted, including the quantity and colour of any transudate. The abdominal cavity was exposed by continuing the incisions caudally and reflecting the sternum and ven-

tral abdominal wall. The colour and quantity of fat in the pericardium, around the heart and kidneys was recorded at the appropriate time during the necropsy.

The thoracic thymus was examined for the presence of petechial haemorrhages, the heart was removed, incised and examined for haemorrhages on the epicardium or endocardium, the lungs were removed, examined and their degree of inflation assessed. The chest wall was examined for broken ribs.

The abdominal cavity was examined for colour, quantity and consistency of any transudate, serofibrinous material or pus. The liver was examined for colour, rupture or haemorrhage. The abomasum was removed, opened and examined for presence of milk or pathological changes. The small and large intestine were examined for the presence and consistency of their contents and any pathological changes in the gut wall and the perineum were observed for evidence of staining by diarrhoea. The umbilicus was examined for inflammatory changes.

After completing the dissection of the thoracic and abdominal cavities, the brain and spinal cord were removed and studied. All observations made during the necropsy were recorded on a form, adapted from the one used by Wilsmore (1984) and Aldomy (1992).

### *Bacteriology*

Samples from liver, heart, kidney and lung were cultured in the Bacteriology Unit at the Central Veterinary Laboratories, Amman, in order to identify bacterial infection.

## RESULTS

One hundred and fifty five lambs and kids which died within neonatal period were

alive at birth. Of 104 lambs that died during the neonatal period and in which the sex was recorded, there were 58 (56%) female and 46 (44%) male. The corresponding numbers in kids were 27 (53%) female and 24 (47%) male.

The cause of the death of 10 out of the 155 lambs and kids that died within the neonatal period was not diagnosed. The results of the causes of neonatal losses are presented in Table 1. One hundred and twenty (77.4%) of all 155 animals died of infectious diseases and another seven (4.5%) – of a combination of infectious and non-infectious causes. Eighteen (11.6%) died because of non-infectious causes such as birth injury, starvation and hypothermia.

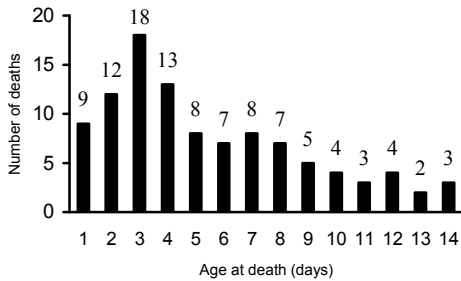
Eighty (51.6%) lambs and kids that died within the neonatal period had diarrhoea: 28 out of 51 kids and 52 out of 104 lambs.

Thirteen (8.4%) of deaths were due to clostridial infection. The most common *post-mortem* signs were diarrhoea, often blood-stained, characteristic ulceration of the intestinal mucosa, congested abomasum and petechial haemorrhages of mesenteric lymph nodes, thymus, endocardium and epicardium.

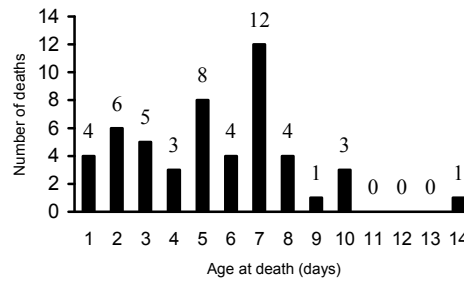
Six (3.8%) of death were due to *E. coli* infection. *Post-mortem* signs of *E. coli* septicaemia were diarrhoea, scanty amount of food in the intestine with presence of gas, patchy congestion of the lungs, enlarged liver and serofibrinous

**Table 1.** Causes of 155 neonatal lambs and kids losses during 2000–2001

Cause	Number of cases			
	lambs	kids	total	
			number	%
<i>Infectious</i>				
Neonatal diarrhoea	40	20	60	38.7
Neonatal diarrhoea and pneumonia	12	8	20	12.9
Enterotoxaemia	10	1	11	7.1
Pneumonia	10	7	17	10.9
<i>E. coli</i> septicaemia	5	0	5	3.2
Pneumonia and orf	0	2	2	1.3
<i>E. coli</i> toxaemia	1	0	1	0.6
Enterotoxaemia and pneumonia	1	1	2	1.3
Peritonitis	2	0	2	1.3
<i>Non-infectious</i>				
Birth injury	7	2	9	5.8
Starvation and hypothermia	1	5	6	3.9
Hypothermia	2	0	2	1.3
Starvation	1	0	1	0.6
<i>Miscellaneous</i>				
Putrefaction	6	0	6	3.9
Pneumonia and starvation	1	0	1	0.6
<i>No diagnosis</i>				
	5	5	10	6.5
<i>Total</i>	104	51	155	100.0



**Fig. 1.** Age at death and number of lambs that died in the neonatal period.



**Fig. 2.** Age at death and number of kids that died in the neonatal period.

material, particularly in the synovial joint fluid from where *E. coli* was isolated. *E. coli* toxæmia was diagnosed in one lamb, *post-mortem* signs being pale kidneys and pale liver, congested lungs, bloated gut with green-yellowish semifluid diarrhoea, enlarged greenish mesenteric lymph nodes.

Respiratory infection was diagnosed in 24 lambs and 18 kids. Orf (sore mouth, contagious pustular dermatitis) was seen in 2 kids in association with other causes of neonatal losses. Peritoneal infection was diagnosed in 2 lambs.

Birth injury was diagnosed in 7 lambs and 2 kids. Starvation and hypothermia were seen in 5 kids and 1 lamb.

Results of neonatal mortality according to time of death are presented in Figures 1 and 2.

## DISCUSSION

This study on local breeds of sheep and goats in Jordan was made to find out the causes of neonatal deaths in order to investigate methods for their control. The data about the percentage of animals that died because of infections or combination of infectious and non-infectious etiological factors are similar to those, reported in previous studies (Aldomy, 1992).

The major causes of death in neonates that did not experience an infectious cause were birth injury, starvation and hypothermia. The results of the investigation demonstrate that losses in neonates may be due to more than one cause in the same animal. The disease can be infectious, non-infectious or combination of both.

Diarrhoea was by far the most common cause of neonatal death: 28 out of 51 kids and 52 out of 104 lambs that died within 14 days of birth were affected by diarrhoea.

Two (1.3%) of deaths were due to *E. coli* septicaemia or toxæmia; *E. coli* was commonly cultured from internal organs of neonates that had diarrhoea. Colibacillosis was commonly reported in neonates kept under intensive conditions, tending to appear sporadically at first then with a rapidly increasing morbidity rate. During lambing and kidding, sheep and goats are gathered in yards for better observation and feeding. Such conditions favour the survival of microorganisms and their passage from one neonate to another. Thus neonatal diarrhoea develops when hygiene in the lambing/kidding area is poor and when the lambing/kidding period is prolonged, enabling a build up of pathogenic microorganisms in the lambs' and kids' environment.

Only one lamb died of starvation and hypothermia whereas 5 Shami kids died of this syndrome. Such a low prevalence of non-infectious causes of neonatal loss in the group of lambs examined indicated the good ability to survive of the Awassi sheep breed and that Shami kids were less resistant to starvation and cold in the neonatal period.

Birth injury was associated with the death of 7 lambs and 2 out of 51 kids. All cases of birth injury were seen in lambs and kids that died within a few hours of birth. Although a higher level of birth injury was seen in sheep than in goats, no conclusion can be made because histories of the dams were not recorded.

The time of deaths in lambs and kids was distributed randomly because many factors were involved, such as the nature of the disease, hygiene and system of management, viability and immunological status of the neonates.

The findings of this survey reflect the common causes of neonatal losses in Jordan because *post-mortem* examination was not performed on animals from selected farms with particular infectious or non-infectious disease problems but on animals from normal farms whose owners sought help to diagnose their problems.

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