

A NATIONAL SURVEY OF PERINATAL MORTALITY IN SHEEP AND GOATS IN JORDAN

F. ALDOMY, N. O. HUSSEIN¹, L. SAWALHA¹, K. KHATATBEH¹ AND A. ALDOMY¹

Jordan Bio-Industries Center (JOVAC), Amman, Jordan; ¹Veterinary Department, Ministry of Agriculture, Amman, Jordan

ABSTRACT

An investigation of perinatal mortality in sheep and goats in nine governorates of Jordan was conducted from May to September 2001. Information from farmers was recorded on questionnaires at the time of farm visits. A total of 305 sheep breeders and 126 goat breeders were interviewed. Perinatal mortality in goats (13%) was almost double that in sheep (7.5%). The majority of abortions occurred in November, December and January and perinatal mortality varied between governorates. The overall kidding rate was higher than lambing rate, probably due to genetic factors. The barren rate in sheep was comparable to that in goats. Neonatal lamb losses were 4.5%, whereas neonatal kid mortality was 8.5%. It appeared that the Jordanian farmers were aware of some of the important causes of perinatal mortality but they did not know how to prevent them.

Key words: Perinatal mortality, small ruminants, epidemiology, Jordan.

INTRODUCTION

Perinatal mortality is a major cause of low productivity of sheep (Stamp, 1967). In Britain, the average annual rate of perinatal mortality may be 15% or more (Barlow *et al.*, 1987), and in Australia, lamb mortality of 15 to 20% has been reported, with 86.6% deaths occurring within the first three days of life (Dennis, 1974).

Many infectious and non-infectious causes of perinatal mortality are incriminated. Mortality rates tend to increase at extremely low or extremely high birth weights (Mendel *et al.*, 1989). Higher litter size has been shown to reduce birth weight and hence the survival of lambs (Turkson and Sualisu, 2005). The aim of this study was to determine the prevalence of losses due to abortions, stillbirths and neonatal mortality (losses within 14 days of birth), to find out the reproductive performance of small ruminants and to solicit farmer's views on the causes of perinatal mortality in Jordan.

MATERIALS AND METHODS

An investigation of perinatal mortality in sheep and goats in 9 governorates of Jordan was conducted from May to September 2001. Majority of small ruminant breeders moved their animals from one place to another and from one governorate to another for grazing of their animals. Therefore, it was difficult to find out a database of owners for flocks and herds. A sample unit contained a single flock or herd. They were randomly selected from 9 governorates of Jordan and were regarded as being typical of the population.

Information from farmers was recorded on questionnaires at the time of farm visits. A total of 305 owners of sheep flocks and 126 goat farmers were interviewed. Information about events that had occurred

during the last lambing or kidding season was collected. Farmers were asked the time at which abortion occurred and the estimated age of foetuses and stillbirths in weeks, taking 150 days as the normal gestation length for females of both species. The following parameters for each species were computed: i) Abortion rate: The number of breeding females that expelled their foetus(es) from the uterus before full term, expressed as a percentage of the total number of breeding females. ii) Barren rate: The number of breeding females that did not produce lambs or kids or failed to conceive during the period of September 2000 to May 2001. iii) Birth rate: The number of breeding females that gave birth to live lambs or kids, expressed as a percentage of the total number of breeding females. iv) Lambing or kidding percentage: The total number of lambs or kids born alive expressed as a percentage of the total numbers of ewes or does available for mating. v) Neonatal mortality: The number of lambs or kids died in the neonatal period, expressed as a percentage of the total number of lambs or kids born alive. vi) Stillbirth rate: The number of breeding females that produced lambs or kids that were born dead at full term, expressed as a percentage of the total number of breeding females. vii) Perinatal mortality: The total losses caused by abortions, stillbirths and neonatal mortality in one breeding season, expressed as a percentage of the sum of aborted, stillborn and lambs or kids born alive. viii) Productivity: The total number of lambs or kids which survived the perinatal period, expressed as a percentage of the total number of breeding females. Neonatal period was taken as the time between birth and 14 days of age.

RESULTS

Reproductive performance

A total of 55,024 breeding ewes from 305 flocks in nine governorates of Jordan, with a mean of 180 ewes in

each flock were included in the study. Out of these, 2,918 (5.3%) were barren, while 50,470 (91.7%) gave birth to live lambs. The total number of lambs born alive was 53,255, giving a lambing percentage of 96.7. Among the latter group, 47,758 (94.6%) ewes produced singles, 2,639 (5.2%) produced twins and 73 (0.1%) produced triplets.

Flock size ranged from 30 to 2,000 ewes. The average ratio of ewes per breeding ram was 25:1 with a range of 1:1 to 100:1 in different flocks.

The breeding performance of 305 sheep flocks is summarized in Table 1. The highest productivity (95.7%) was observed in Jordan Valley and the lowest (84.8%) was recorded in Irbid governorate. The average productivity was 90.5%. The highest barren rate (9.3%) was recorded in Karak governorate and the lowest (4.3%) was recorded in Amman governorate. The overall lambing percentage was 96.7% and the birth rate was 91.7%.

For goats, 126 herds surveyed from nine governorates of Jordan contained 8,356 breeding does. Mean herd size was 66 does with a range from 15 to 275. The herds contained 349 breeding bucks, a mean of one buck for every 25 does. Numbers of bucks in each herd ranged from one to 16. Of the 8,356 does recorded, 7.3% were barren. In individual herds, the barren rate ranged from 0 to 9.6%. The number of does which gave birth to live kids was 7,373 (88.2%). Among these, 5,362 (72.7%) does gave birth to singles, 1,834 (24.9%) gave birth to twins, 177 (2.4%) gave birth to triplets and seven (0.1%) gave birth to quadruplets.

A summary of the breeding performance of the 126 goat herds is shown in Table 2. The highest productivity (176.7%) was recorded in Mafrak, whereas the lowest productivity (82.3%) was recorded in Madaba governorate. The highest barren rate (16.3%) was seen in Madaba, while the lowest was in Mafrak (1.9%). The overall kidding percentage was 114.5 and the birth rate was 88.2%.

Perinatal mortality

Of the 55,024 ewes recorded, 1,184 (2.2%) aborted and 452 (0.8%) produced stillbirths. Percentages of the flock that aborted varied from none to 22.2%. Of the 305 flocks surveyed, 142 (46.5%) flocks had no history of abortion. As shown in Table 3, the highest percentage of flocks affected by abortion was in the Amman governorate (80%), while the lowest percentage affected was in the Zarka governorate (21.7%). The highest abortion rate was seen in Irbid governorate (4.3%) and the lowest (0.4%) was in Zarka governorate (Table 3).

Of the 305 sheep flocks surveyed, 142 (46.5%) had no history of abortion. In most of the flocks (53.4%), abortions occurred in November-January, while the least numbers of flocks with abortions were recorded in June. The majority of the abortions occurred in the last trimester, mostly within the last four weeks of gestation.

In 1,184 aborted ewes, 63% were from the age group

3-5 years old, 25% were in 1-2 years age group, while the age group above 5 years showed the least number of abortions (12%). Neonatal lamb losses were recorded in 226 (74%) of 305 flocks surveyed, and overall, 4.5% of lambs died in the neonatal period.

For goats, of the 8,356 does recorded, 272 (3.3%) aborted and 1.2% showed stillbirths. The percentage of herds affected by abortion was highest in Jarash (21%) and lowest in Karak and Mafrak governorates (2% each). The highest abortion rate was recorded in Karak (11.2%) and the lowest was in Mafrak (Table 4).

Considering age, the highest abortion rate (60%) was recorded in 3-5 years old does, followed by 23% in 1-2 years old animals and 17% in above 5 years old age group. In herds with abortion, most abortions occurred in November-January and the least was recorded in April. Only 62 (49.2%) herds had a history of abortion. Most abortions occurred in the last 7 weeks of pregnancy. Of 9,561 kids born alive, 816 (8.5%) died within the neonatal period.

Farmer's opinions regarding perinatal mortality

The majority of farmers (65%) believed that abortion in ewes was due to non-infectious causes such as trauma (22%), lack of food (30%), congenital defects (2%), overfeeding (5%) and food poisoning (6%), whereas 35% farmers believed that abortion was due to infectious agents such as sheep pox, Brucella, Clostridia, contamination of water with deleterious microbes, mycotic and other unknown causes. Other factors considered by farmers to be causes of neonatal mortality were: mastitis in the dam, lamb paralysis, mismothering and overfeeding of lambs.

Goat breeders believed that causes of prenatal mortality in goats were, in order of importance, lack of feed, Capri pox, poisoning especially plant poisoning, trauma, overfeeding and congenital defects. Farmers considered that the most important causes of neonatal loss were diarrhoea, cold and unknown infections.

DISCUSSION

Perinatal mortality is a problem in sheep and goats worldwide and may vary from region to region within the same country and from one year to another year, depending on the relation between environment, pathogens and the host. Speedy *et al.* (1976) reported that perinatal mortality is commonly a result of non-infectious causes. Influence of lambing during various seasons on sheep production has been studied by several authors (Demiroren *et al.*, 1995; Sormunen-Christian and Suvola, 1999; Hansen and Shrestha, 2002; Rosa and Bryant, 2003; Fisher, 2004).

Data from the present survey showed that perinatal mortality in goats (13%) was almost double that in sheep (7.5%). This finding agrees with that of Aldomy (1992), who reported the perinatal mortality in goats as

24.8% versus 12.5% in sheep. Sušić *et al.* (2005) reported 11% perinatal mortality in sheep in Croatia, which is higher than that recorded in the present study. Such losses have also been studied in Australia, New Zealand and United Kingdom, with an average annual rate in Britain and elsewhere of 15% or more (Barlow *et al.*, 1987).

Most of the perinatal mortality occurred in November, December and January in both species. This reflects the situation in Jordan, where lambing and kidding usually takes place in winter between October and March. Most breeders keep their animals under extensive system of management, but change to a semi-intensive or intensive system in winter when lambing and kidding starts. This system may enhance the survival of pathogens and allow them to spread within flocks and herds. Several researchers (Ambruster *et al.*, 1991; Notter *et al.*, 1991; Gatenby *et al.*, 1997) stated that perinatal lamb deaths, which occur around parturition, result in significant lamb losses and the extent of perinatal mortality depends mostly on the management system (Munir *et al.*, 2008), but the major factors affecting lamb survival include age of lamb, litter size, birth weight, nutrition and parity of the ewe and season of birth.

The majority of abortions in sheep and goats occurred in the last month of gestation. Infectious diseases such as brucellosis, campylobacteriosis, toxoplasmosis, chlamydia and Q fever usually cause abortion in late gestation, therefore, special attention should be paid towards looking for them. They can be of considerable economic importance to the sheep and goat industry. As they are zoonotic in nature, they are also of concern for the public health.

Older ewes and does had lower abortion rates compared to younger age groups. This also suggests infectious causes of abortion because older animals usually have a higher level of immunity against infection than younger animals. The middle age group of animals were from three to five years old, the reason why this group was not divided into smaller groups was because farmers were unable to remember sufficient details to allow further subdivision.

Although the barren rate in sheep (5.3%) was comparable to that in goats (7.3%), majority of barren ewes came from desert areas and according to farmers opinion poor fertility was associated with lack of feed. The year of 2000-2001 was a dry year, with poor pastures in the desert. Comparatively few goats are grazed in the desert. However, poor nutrition is not the only cause of

infertility and infectious diseases should also be considered as causes. Reasons for barrenness may include poor and imbalanced nutrition, use of old breeding females, congenital problems, hormonal imbalance and infectious diseases. Barren animals may remain in anoestrus, may not conceive, may conceive but the embryo fails to survive. The barren rate may be reduced by culling old animals and those that have been barren previously before tuppung and replacing with young animals from within the same flock. An annual replacement rate of 20% is recommended. When replacements are bought from the market, it is advisable to keep them apart from the rest of the flock before monitoring them for infectious disease such as brucellosis.

The overall kidding rate was higher than the lambing rate, which might have been due to genetic factors because most of the local breeds of goats which normally gave birth to single kids were crossbred with Shami goats, a high yielding goat which normally produces twins and triplets and occasionally quadruplets. Only 5.2% of ewes gave birth to twins and one of every 5000 ewes gave birth to triplets. None of the ewes gave birth to quadruplets, whereas 24.9% of does gave birth to twins. Similar findings have been reported in sheep and goats in Jordan (Aldomy, 1992). The overall ratio of breeding rams to breeding ewes in the survey area was 1:24, whereas the ratio of bucks to does was 1:25. These are acceptable ratios.

It seems that the Jordanian farmers were generally aware of some of the important causes of perinatal mortality but they did not know how to prevent such losses. This can be achieved by better communication with farmers through different types of media, education and extension programmes, seminars and training. Vaccination campaigns can deal with some specific causes of perinatal losses. However, each problem cannot be solved without an understanding of the epidemiology of the disease concerned and an ability to diagnose it.

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Table 1: Breeding performance of 305 sheep flocks surveyed in Jordan

Governorate	Barren rate (%)	Birth rate (%)	Lambing percentage	Productivity (%)
Amman	4.3	91.3	95	92.1
Irbid	5.2	89.3	96.2	84.8
Jarash	4.6	91.3	96.3	90.2
J.Valley	4.9	90.6	97.4	95.7
Karak	9.3	87.8	91.7	87.6
Madaba	6.0	90.7	97.4	93.4
Mafrak	5.4	92.5	95.8	92.7
Salt	5.3	92.7	99.7	95
Zarka	4.7	94.3	97.8	95.5
Overall	5.3	91.7	96.7	90.5

Table 2: Breeding performance of 126 goat herds surveyed in Jordan

Governorate	Barren rate (%)	Birth rate (%)	Kidding rate (%)	Productivity (%)
Amman	13.2	82	118.3	107.5
Irbid	2.9	91.4	125.8	117.2
Jarash	6.8	87.5	116.1	103.3
Jordan Valley	3.5	90	107.4	98
Karak	6.6	85.9	93.3	85.6
Madaba	16.3	81.3	89.3	82.3
Mafrak	1.9	97.2	181	176.7
Salt	4.3	93.3	109.1	97
Zarka	10.4	86.2	106.6	102.3
Overall	7.3	88.2	114.5	104.8

Table 3: Percentages of flocks affected by abortion, abortion rates in affected flocks and percentages of sheep that aborted in different governorates

Governorate	Flocks affected by abortion (%)	Abortion rates in affected flocks (%)	Percentage of sheep aborting in governorates
Amman	80	4.6	3.8
Irbid	61.9	6.1	4.3
Jarash	71.1	3.7	2.7
Jordan valley	75	0.7	3.3
Karak	29.6	5.9	2.4
Madaba	52.3	3.3	2.2
Mafrak	53.6	2.2	1.8
Salt	48.6	2.1	1.3
Zarka	21.7	1.2	0.4
Overall	53.4	3	2.2

Table 4: Abortion shown as percentages of herds affected and individuals affected within the herds in the different governorates

Governorate	%age of herds affected by abortion	Mean abortion rates (%)	%age of does aborting in the governorate
Amman	5	5.9	3.3
Irbid	11	6.8	4.7
Jarash	21	5.5	4.2
Jordan Valley	5	7.1	4.3
Karak	2	11.2	6.6
Madaba	3	4.8	2.4
Mafrak	2	2.7	0.6
Salt	10	4.2	1.6
Zarka	3	5	1.3

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