

## Dairy Cattle Farming in Kars District, Turkey: II. Health Status

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Received: 19.02.2003

**Abstract:** This study was designed to determine the health status of dairy cattle, and the rates of and reasons for culling on dairy farms in Kars. A 2-stage stratified sampling strategy was used to select localities and farms. The study involved an interview with the farmers and regular visits to the farms. The farm prevalence levels of abortion, foot- and -mouth disease (FMD), respiratory problems, leptospirosis, blackleg, hardware (TRP), bloat and anthrax were 46.7%, 57.8%, 4.4%, 13.3%, 4.4%, 11.1%, 8.8% and 0% in 2001 and 53.3%, 62.2%, 17.8%, 17.8%, 4.4%, 11.1%, 11.1% and 8.8% in 2002, respectively. Incidence rates (animal-years/100) for abortion, leptospirosis, blackleg and anthrax were 7.7, 0.5, 0.2, and 0 in all herds and 20, 3, 8.7, and 0 in affected herds in 2001, and 6.7, 2.1, 0.2, and 0.4 in all herds and 12.5, 11, 6.1, and 1.9 in affected herds in 2002, respectively. Vaginal discharge (84.4%), infertility (40%), mastitis (55.6%), retained placenta (42.2%), dystocia (31.1%), weight loss (46.7%) and anorexia (31.1%) were the most common clinical problems encountered at farm level and animal level in the postpartum period. Around 11% of the farmers reported culling of their animals. The most common reasons for culling were old age (34.7% and 30.5%), abortion (22.6% and 19.5%), FMD (14.5% and 7.6%), infertility (1.6% and 14.4%), respiratory problems (4.8% and 5.1%), TRP (5.6% and 2.5%) and leptospirosis (0.8% and 3.4%) in 2001 and 2002, respectively. It is concluded that more detailed epidemiological studies addressing each disease are a prerequisite if profitable farming and preventive measures are planned.

**Key Words:** Clinical problems, postpartum health, culling, dairy cattle.

### Kars Yöresinde Süt Sığırcılığı: II. Sağlık Durumu

**Özet:** Bu çalışma, Kars ilindeki sütçü sığırların sağlık durumları, ayıklama oranları ve sebeplerinin belirlenmesi amacıyla planlanmıştır. Bölgeleri (7) ve çiftlikleri (45) belirlemek için "iki safhalı kota örnekleme metodu" kullanıldı. Çalışma kapsamında çiftlikler düzenli şekilde ziyaret edilerek, çiftçilerle yüz yüze görüşmeler yapıldı. Atık, şap, solunum sistemi problemleri, leptospirosis, yanıkara, retiküloperitonitis travmatika (RPT) ve timpani problemlerinin çiftlik prevalansı sırasıyla 2001 yılında; % 46,7, % 57,8, % 4,4, % 13,3, % 4,4, % 11,1, % 8,8 ve % 0 ve 2002 yılında; % 53,3, % 62,2, % 17,8, % 17,8, % 4,4, % 11,1, % 11,1 ve % 8,8 olarak bulundu. Tüm sürülerde ve hastalıktan etkilenen sürülerde atık, leptospirosis, yanıkara ve anthrax için insidans oranları (hayvan-yıl/100) 2001 yılında sırasıyla 7,7, 0,5, 0,2, 0 ve 20, 3, 8,7, 0 olarak hesaplandı. Bu oranlar 2002 yılı için ise sırasıyla 6,7, 2,1, 0,2, 0,4 ve 12,5, 11, 6,1, 1,9 olarak hesaplandı. Postpartum döneminde çiftlik ve hayvan bazında vajinal akıntı (% 84,4), infertilite (% 40), mastitis (% 55,6), retensio secundinarum (% 42,2), güç doğum (% 31,1), kilo kaybı (% 46,7) ve anoreksi (% 31,1) en sık karşılaşılan sağlık problemleri olmuştur. Çiftçilerin yaklaşık % 11'i hayvanlarını elden çıkarttığını (ayıklama) rapor etti. 2001-2002 yıllarında sırasıyla en sık rastlanan ayıklama nedenleri; yaşlılık (% 34,7 ve % 30,5), atık (% 22,6 ve % 19,5), şap (% 14,5 ve % 7,6), infertilite (% 1,6 ve % 14,4), solunum problemleri (% 4,8 ve % 5,1), RPT (% 5,6 ve % 2,5) ve leptospirosis (% 0,8 ve % 3,4) olarak belirlendi. Sonuç olarak, kârlı bir hayvan yetiştiriciliği ve koruyucu önlemlerin alınması planlanıyorsa her bir hastalığa yönelik daha detaylı epidemiyolojik çalışmalar gerekmektedir.

**Anahtar Sözcükler:** Klinik problemler, doğum sonrası sağlık, ayıklama, süt sığırı

### Introduction

One advantage of screening disease occurrences on a farm is the accumulation of valuable information on all diseases and allowing farmers and veterinarians to confidently determine priorities for the design of

preventive measures which consequently leads to the avoidance of economic losses associated with diseases (1). This process is especially important where animal rearing and production are key economic activities, as in Kars. The economy of the Kars district depends largely on

\* This project was funded by the Scientific and Technical Research Council of Turkey, Project code: VHAG-1777

agriculture and animal husbandry and a considerable proportion of the population is employed in this sector (2). Therefore, factors resulting in economic losses are unwanted by producers and the district as a whole. Livestock diseases are a major constraint on profitable farming (3-5) and a knowledge of disease occurrence is therefore important. Another important factor that influences the future of a herd is culling. Culling is described as voluntary and involuntary. Voluntary culling occurs when the farmer has complete freedom of choice over the removal of a cow from the herd (e.g., low milk production or old age) whereas involuntary culling occurs when there is no choice but to remove the animal from the herd (e.g., infectious disease or infertility). Voluntary culling usually leads the farmer to refresh the herd, and, thereby leads to increased profits while involuntary culling causes economic losses due to the removal of the animal. It is well documented that optimum herd profitability is attained by increasing the number of animals culled for voluntary reasons and reducing the number of animals culled for involuntary ones (6-8).

A previous cross-sectional study determined the annual incidence rate of major infectious diseases of cattle in the district (9). These findings were subsequently confirmed by serological surveys and case reports where abortion, brucellosis, anthrax, blackleg, leptospirosis and foot- and -mouth disease (FMD) were identified as major health problems in Kars (10-15). However, these studies were confined to infectious diseases and no complete survey of on-farm events, including clinical problems of dairy cattle during and after parturition and culling, was made. This prompted us to obtain a comprehensive view of the health problems of dairy cattle in Kars.

An epidemiological study was, therefore, designed to determine the health problems, culling rate and reasons for culling on dairy farms in Kars.

## Materials and Methods

Details of farm selection and study design are given in part I of this study (16). Briefly, a 2-stage stratified sampling strategy was used to select localities and farms from a list of dairy farmers provided by the District Office of the Ministry of Agriculture and Rural Affairs (DOMARA). The study involved an interview with the farmers using a pretested structured questionnaire and visits to the selected farms at regular intervals. Any

clinical problems reported or encountered in dairy cattle were recorded during the visits. Clinical problems were diagnosed based on clinical signs, either by veterinarians or by the authors. The syndrome characterised by icterus and haemoglobinuria was referred to as leptospirosis in this study.

## Data Analyses

Two estimates of the frequency of clinical diseases of dairy cattle were calculated in this study: the farm level prevalence of all diseases diagnosed or reported during the study and the crude within-herd incidence rate for abortion, leptospirosis, blackleg and anthrax. These were estimated from clinical cases reported between September 2000 and September 2001 (referred to as 2001 in the text), and between September 2001 and September 2002 (referred to as 2002 in the text). The farmers were also asked to state any diseases they had had on their farms up until 2001 (referred to as 'ever' in the text). To calculate the within-herd incidence rate, the mean number of dairy cattle present in 2001 (1114 dairy cattle) and 2002 (1052 dairy cattle) was used to estimate the number of animals at risk. The within-herd incidence rate of each disease was calculated separately for herds reporting clinical disease and for all herds (1,17,18).

Data were numerically coded, entered into a database (Microsoft Access 2000) and analysed using Epi info 6. Yates corrected chi squared test was used to compare the differences between levels (19). The significance level was set at  $P < 0.05$ .

## Results

### Frequency of livestock diseases

Farm level prevalences of clinical problems recorded as 'ever', in 2001 and in 2002 are given in Table 1. Major prevailing health problems were abortions and FMD (Table 1) and a small proportion of farmers also reported bloat, constipation, traumatic reticuloperitonitis (TRP), respiratory problems, leptospirosis, blackleg, anthrax, infectious bovine keratoconjunctivitis (IBK), lameness and other problems (malignant catarrhal fever (MCF), hypocalcaemia, colic, diarrhoea, trauma, papillomatosis and parasitism) on their farms (Table 1).

The within-herd incidence rates for abortion, leptospirosis, blackleg and anthrax calculated in all herds

Table 1. Estimated farm prevalence of livestock disease 'ever', in 2001 and in 2002.

	Farm prevalence (%) N = 45		
	'Ever' (95%, CI)	2001 (95%, CI)	2002 (95%, CI)
Abortion	71.1 (55.7-83.6)	46.7 (31.7-62.1)	53.3 (37.9-68.3)
Bloat	40 (25.7-55.4)	8.8 (2.5-21.2)	11.1 (3.7-24.1)
Constipation	37.8 (23.8-53.5)	4.4 (0.5-15.1)	6.6 (1.4-18.3)
TRP	33.3 (20-49)	11.1 (3.7-24.1)	11.1 (3.7-24.1)
FMD	57.8 (42.2-72.3)	57.8 (42.2-72.3)	62.2 (46.5-76.2)
Respiratory problems	31.1 (18.2-46.6)	4.4 (0.5-15.1)	17.8 (8-32.1)
Leptospirosis	15.6 (6.6-30.1)	13.3 (4.1-26.8)	17.8 (8-32.1)
Blackleg	0	4.4 (0.5-15.1)	4.4 (0.5-15.1)
Anthrax	0	0	8.8 (2.5-21.2)
IBK	0	2.2 (0.1-11.8)	6.6 (1.4-18.3)
Lameness	0	4.4 (0.5-15.1)	4.4 (0.5-15.1)
Others	6.6 (1.4-18.3)	0	11.1 (3.7-24.1)

N = number of farms, % = percentage, CI = confidence interval

and in affected herds in 2001 were 7.7, 0.5, 0.2, and 0 and 20, 3, 8.7, and 0, respectively. The incidence figures calculated for abortion, leptospirosis, blackleg and anthrax in all herds and affected herds in 2002 were 6.7, 2.1, 0.2, and 0.4 and 12.5, 11, 6.1, and 1.9, respectively. The incidence rate of leptospirosis in 2002 in all herds and in affected herds was significantly higher than that in 2001 ( $P = 0.002$ ) (Table 2).

#### Postpartum problems

Health problems encountered after parturition are presented in Table 3. The most common postpartum

problems recorded at farm level were vaginal discharge (84.4%), mastitis (55.6%) and weight loss (46.7%) followed by retention of foetal membranes (42.2%), infertility (40%), dystocia (31.1%) and anorexia (31.1%) (Table 3). The highest incidence rate was calculated for vaginal discharge, followed by infertility among affected herds (Table 3).

#### Culling of dairy cattle

The proportions of farms which culled their dairy cattle in 2001 and 2002 were 71.1% and 73.3%, respectively. The total numbers of cattle culled in 2001

Table 2. Incidence rates of diseases recorded in 2001 and in 2002 (animal-year/100).

	Incidence rate			
	2001		2002	
	All herds	Affected herds	All herds	Affected herds
Abortion	86/1114 (7.7)	86/542 (20)	71/1052 (6.7)	71/568 (12.5)
Leptospirosis*	6/1114 (0.5)	6/210 (3)	22/1052 (2.1)	22/201 (11)
Blackleg	2/1114 (0.2)	2/23 (8.7)	2/1052 (0.2)	2/33 (6.1)
Anthrax	0	0	4/1052 (0.4)	4/213 (1.9)

\* Significant increase in 2002 ( $P = 0.002$ )

Table 3. Postpartum problems encountered in 2002 on 45 farms in Kars.

	Farm prevalence N = 45 (%) (95% CI)	Incidence rate (animal-year/100)	
		All herds	Affected herds
Dystocia*	31.1 (18.2-46.6)	27/1052 (2.6)	27/340 (7.9)
Vaginal discharge	84.4 (70.5-93.5)	234/1052 (22.2)	234/873 (26.8)
Infertility	40 (25.7-55.7)	59/1052 (5.6)	59/393 (15)
Retained placenta	42.2 (27.7-57.8)	59/1052 (5.6)	59/485 (12.2)
Mastitis	55.6 (40-70.4)	40/1052 (3.8)	40/559 (7.2)
Weight loss	46.7 (31.7-62.1)	85/1052 (8.1)	85/573 (14.8)
Anorexia	31.1 (18.2-46.6)	29/1052 (2.8)	29/303 (9.6)
Hypocalcaemia	6.7 (1.4-18.3)	4/1052 (0.4)	4/66 (6.1)
Constipation	2.2 (0.1-11.8)	1/1052 (0.09)	1/17 (5.9)

N = number of farms, % = percentage, CI = confidence interval

and in 2002 were 124 and 118, accounting for 11.1% (124/1114) and 11.2% (118/1052) of the dairy cattle population, respectively (Table 4).

Voluntary culling constituted 34.7% and 30.5% of total culls in 2001 and 2002, respectively. The remaining culls were performed involuntarily. The most common

reasons for culling were old age, abortion and FMD in both years, and additionally infertility in 2002 (Table 4). The increase in the number of farms experiencing culling due to infertility in 2002 was significantly higher than that in 2001 ( $P = 0.005$ ). The only reason reported for voluntary culling was old age, and the remaining reasons were reported for involuntary culling.

Table 4. Culling rate and reasons reported in 2001 and 2002 on 45 dairy farms in Kars.

	2001		2002	
	FC = 32 (%)	AC = 124 (%)	FC = 33 (%)	AC = 118 (%)
Old age	43.8	34.7	42.4	30.5
Abortion	25	22.6	24.2	19.5
Infertility*	3.1	1.6	21.2	14.4
FMD	18.8	14.5	12.1	7.6
TRP	15.6	5.6	9.1	2.5
Leptospirosis	3.1	0.8	12.1	3.4
Lameness	6.3	4.8	3	0.8
Mastitis	6.3	3.2	3	0.8
Respiratory problems	3.1	4.8	6.1	5.1
Hypocalcaemia	6.3	1.6	0	0
Blackleg	0	0	6.1	1.7
Bloat	0	0	9.1	2.5
Parasite infestation	0	0	3	0.8
Uterine prolapses	0	0	3	0.8
Emergency	0	0	6.1	7.6
MCF	3.1	0.8	0	0
Eye problem	3.1	0.8	0	0
Unknown	12.5	4	3	1.7

FC = number of farms reported culling, AC = number of animals culled, % = percentage, \*significant increase in 2002 ( $P = 0.005$ )

### Vaccine use and parasite control

The proportion of farms reported using vaccines against any diseases was 95.6%. The most common vaccine used was FMD (95.6%) and the least common was Brucella vaccine (28.9%) (Table 5).

Control of external and internal parasites was carried out on 88.9% and 71.1% of the farms, respectively. Deworming usually took place before the animals were housed on the majority of the farms (Table 5).

Three of the farms also reported rodent control (Table 5).

### Discussion

The epidemiological method used in the present study employed both retrospective questioning and prospective recording of disease events on the farms. This process enabled the authors to compare disease occurrence reported by the farmers and that determined by the authors as 'ever', in 2001 and in 2002. This comparison revealed that the figures for farm prevalence obtained in 2001 and 2002 were not significantly different. This good agreement implies that farmers' recall may be of help in future epidemiological studies involving retrospective questioning such as postal questionnaire surveys.

Clinical diseases identified in this survey are in agreement with the results of previous serological studies (11-13), case reports (10,14,15,19) and cross-sectional studies (9). This study additionally determined the farm prevalence and the incidence rate of clinical problems including postpartum health problems in all herds and in affected herds, as well as the rate of and reasons for culling in dairy cattle.

The farm level frequency of cattle abortion in Kars was unknown. Farm prevalence and within-herd incidence rates of abortion determined in this survey were higher than those reported for other parts of the world (20,21), but the incidence rate obtained for all herds was slightly lower than the 8.5% reported by Özkan et al. (9). This may reflect a true decrease in abortion cases over the years. However, the incidence rate was quite high in affected herds. This implies that causes of abortion require urgent detailed investigation in the district. Brucella spp. have been implicated in around 40% of cattle abortions in Kars (15). However, around 60% of the abortions have been left undiagnosed. It is of paramount importance to determine the causes of and risk factors for abortion and to take the appropriate preventive measures in the district. This is imperative owing not only to the great economic losses associated with abortion but also to the zoonotic implications of the causative agents involved, such as Brucella spp. and Leptospira spp.

Table 5. Vaccine use and parasite control reported on 45 dairy farms in Kars.

	No. of farms (n = 45)	Percentage (%)
Vaccine use against	43	95.6
FMD	43	95.6
Blackleg	37	82.2
Anthrax	35	77.8
Leptospirosis	34	75.6
Brucellosis	13	28.9
Control of external parasites	40	88.9
before turn out	4	10
before housing	24	60
both	12	30
Control of internal parasites	32	71.1
before turn out	4	12.5
before housing	19	59.4
both	9	28.1
Rodent control	3	6.7

Leptospirosis appeared to be an ongoing health problem on the farms studied. This is in agreement with serological studies conducted in the region, in which around 30% of cattle appeared to have antibodies against *Leptospira* spp. (11,13) and with a previous cross-sectional study (9) in which the incidence rate was 0.6%. However, the incidence rate of clinical leptospirosis in affected herds in this survey was much higher than that reported by Özkan et al. (9) but closer to that reported for other parts of the world (22,23). Leptospirosis, like abortion, has a detrimental effect on the profitability of the herd because it causes abortion, death of animals, low milk production and condemnation of milk produced during the course of the disease. It has also a zoonotic implication for human beings (22).

Anthrax was another major health problem recorded in cattle in Kars, as previously reported (9,10,14). The incidence rate for all herds in the present study was similar to the 0.5% recorded by Özkan et al. (9). However, one hospital based study by Özcan et al. (14) revealed that around 15% of samples from cattle submitted to the Department of Pathology, Faculty of Veterinary Medicine, Kafkas University between 1994 and 1998 were diagnosed as anthrax. This may suggest that the frequency of anthrax in the region may be much higher than that in the current report. Furthermore, it should be noted that anthrax is serious cause for concern as it has been reported in human beings in Kars (10).

Blackleg was another disease affecting cattle. This is in agreement with previous studies (9,14). The incidence rate for all herds in this survey was slightly lower than the 1.8% reported by Özkan et al (9). Blackleg is an inevitably fatal disease of cattle and, therefore, causes financial losses to farmers (22).

FMD has long been a clinical problem in Kars (9,19). This was also confirmed in this survey. A significant proportion of farms suffered from FMD. As the morbidity of FMD is around 100% (22), no attempts were made to calculate the within-herd incidence rate. FMD is well known to cause economic losses through death, decreased milk production and chronic weight loss (9,22).

Alimentary tract disorders, namely bloat, TRP and constipation were also recorded on one-third of the farms surveyed. This finding is in accordance with clinical observations in the region (24,25). Alimentary tract

disorders cause poor feed intake and feed conversion efficiency and, thus, result in low production. Additionally, TRP has financial consequences due to expensive treatment, reduced production and even the death of the animals (22).

The survey has shown that significant numbers of farms and dairy cattle were affected by parturition. Parturition is a key event in the life of a cow. Many disorders and significant economic losses through veterinary costs or reductions in production are associated with the postpartum period. Dystocia, mastitis, retention of foetal membranes, metritis and milk fever are common disorders encountered in the post-parturition period (26-28). Clinical problems diagnosed during the postpartum period in this survey are in agreement with those in other studies carried out in other parts of the world, although the farm prevalence and incidence rates of these disorders were much higher in the present study (26-29). This finding may indicate poor management in the postpartum period and also demands a detailed study in Kars.

The survey revealed that livestock diseases such as abortion, FMD and leptospirosis, are endemic in the region and that a considerable proportion of cows suffer from disorders in the postpartum period. These health problems exert great constraints on animal rearing and production (3,4) and, thus result in tremendous economic losses to farmers and the district, as is evident in the figures obtained for culling where the major reasons for culling were abortion, FMD and infertility.

Culling figures show that around 11% of dairy cattle are removed from the total herd every year. The culling rate in this study was lower than that reported for other parts of the world (6,8,30-33). In contrast to other studies, reasons for involuntary culling such as infectious diseases constituted a considerable proportion in this study (6,8,31). This is likely to be related to the diseases present in the herd or region, as there is a strong relationship between existing diseases in a herd and culling (6-8).

The proportion of farms using vaccines and controlling external and internal parasites was higher than that reported by Dutil et al. (30). However, despite intensive vaccination higher frequencies of infectious diseases such as abortion, FMD and leptospirosis raise questions about the effectiveness of vaccines. It is likely

that field strains of infectious agents may not exist in the vaccines used for immunisation. However, the reason(s) for possible vaccine failures should fully be investigated.

The higher levels of involuntary culling, infectious diseases (e.g., abortion, leptospirosis and anthrax), alimentary tract disorders, and postpartum problems are major obstacles to feasible and profitable dairy farming in

Kars. Furthermore, infectious diseases endemic in the district have zoonotic implications and pose a great risk for public health. It is, therefore, crucial that more detailed epidemiological studies addressing each disease be carried out if proper preventive and control strategies are to be developed and implemented.

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