

Mortality in Dairy Cows Transported to Slaughter as Affected by Travel Distance and Seasonality

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Abstract

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A significant lapse in welfare conditions of dairy cows being shipped to slaughter may result in higher death rates of the animals in the course of transportation.

The objective of this work was to quantify the rate at which dairy cows die while transported to slaughter facilities, to determine the impact of travel distance on this rate, the seasonal effect on the number of deceased cows, and to identify any developmental trends associated with these losses.

In the period of 1997 - 2004, veterinary inspectors in the Czech Republic tracked the deaths of dairy cows in connection with their transportation to slaughter. Of the total number of 1,107,685 monitored dairy cows transported to slaughter in the Czech Republic in the period from 1997 to 2004, 418 dairy cows died. The death rate was determined to be 0.038%. However, the mortality varied depending on the distance travelled, from 0.013% for trips not exceeding 50 km, to 0.183% for trips longer than 300 km.

Comparing Period I (1997 - 2000) with Period II (2001 - 2004), the overall death rate of dairy cows attributable to slaughterhouse-bound transportation rose from 0.023% to 0.057% (a 2.51 index) and the difference between periods was highly significant ($p < 0.01$). This outcome revealed an undesirable long-range trend of rising dairy cow mortality in all travel distances.

The obtained results document a relatively low sensitivity of dairy cows to stresses arising from shipment to slaughter as indicated by transportation-related deaths. However, the growing trend in the number of dairy cows dying on their way to slaughter is a warning sign in relation to the welfare of cows subjected to such transportation.

Cattle, death rate, welfare, stress, journey time, summer months, winter months

Poor welfare of dairy cows during transport is accompanied by a significant rise of stress levels in the animals prior to slaughter, and may be reflected in a higher death rate of the cows undergoing transportation. The number of animals dying en route and shortly after delivery to the abattoir may serve as an indicator that the transport experienced a grave disruption of welfare conditions.

Cattle welfare during its transportation to a slaughterhouse in terms of stress levels in the animals was studied by von Holleben et al. (2003). They monitored the handling of slaughter-bound cattle as it travelled in Germany.

A stress load in cows manifests itself by changes in blood-based indicators of stress. Mudroň et al. (2005) studied stress response in dairy cows as related to glucose in blood. The secretion of adrenocorticotrophin from peripheral bovine lymphocytes under transport-induced stress was studied by Dixit et al. (2001). The influence of transport stress on peripheral blood neutrophils and on somatic cell counts in milk was analyzed by Yagi et al. (2004). Verkerk et al. (1998) studied the influence of transport stress on milk cortisol concentrations in lactating dairy cows. Morrow et al. (2002) were concerned with the effects of transport-related stress on faecal glucocorticoid metabolites in dairy cattle. Likewise, Palme et al. (2000) and Most et al. (2002) considered the effects of transport-related stress on faecal cortisol metabolite concentrations.

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Broom (2003) scrutinized transport-generated stresses in cattle in detail, inclusive of physiological, ethological and other indicators.

Transport conditions affect the well-being of transported cattle. They also influence the occurrence of disorders of the locomotor apparatus in cattle due to transportation, the frequency of physical damage to the slaughter-bound animals, and the potential for lower carcass and meat quality. The occurrence of damage to the locomotor apparatus in cattle in consequence of improper handling during the transfer to slaughter was noted by Pištěková et al. (2004). A mechanical damage to the animals in the course of transportation, and the spread of processes triggered by cattle exposure to stress may be instrumental in veterinary decisions concerning the suitability of the meat for human consumption, and may increase the incidence of meat being considered unfit for that purpose because of a decline in sensory qualities, as reported by Večerek et al. (2003). The effect of distance involved in cattle transportation to a slaughter facility on carcass bruises was studied by Hoffman et al. (1998). Villarroel et al. (2003) were concerned about the effects of commercial transport on cattle welfare and meat quality in Spain.

Grandin (1999) concentrated on mitigating the stress levels in cattle by practicing low-stress cattle-handling techniques. Wikner et al. (2003) analyzed the factors affecting stress levels in transported cattle. In terms of behavioural analysis, they emphasised driving performance, proper handling during loading and unloading, and air quality inside the vehicle. Villarroel et al. (2003) considered the influence of various climatic conditions on the stress in cattle undergoing transportation. Among the stress factors, von Holleben et al. (2003) included also re-grouping, loading, transport time, loading density, mounting prevention, unloading, and lairage time.

The objective of this work was to establish the death rates prevalent in dairy cows shipped to slaughter facilities in the Czech Republic in the period of 1997 - 2004, to determine the effect of travel distance and season on these death rates, and, in addition, to identify any developmental trends in the numbers of dairy cows dying in the process of being transported to slaughter.

Materials and Methods

In the period of 1997 - 2004, State Veterinary Administration of the Czech Republic monitored the numbers of dairy cows shipped to facilities for regular slaughter. A record was kept of the cows deceased in connection with the transportation, namely the number of cows that expired directly in the conveyance or after delivery into the facility. The shipments of dairy cows intended for forced slaughter were not monitored, as the situation typically involved dairy cows in poor health, where the cow's possible death could be the consequence of an existing illness rather than its transfer to a slaughter facility.

A ratio of the dead animal count to the transported animal total was computed and expressed as a percentage for the entire period under observation, thus representing the overall dairy cow mortality associated with transportation to slaughter.

Also computed as percentages were ratios of the dead animal counts to the transported animal totals for travel distances of up to 50 km, 51 to 100 km, 101 to 200 km, 201 to 300 km and over 300 km. These results served to ascertain the effect of travel distance on the dairy cow mortality attributed to slaughterhouse transportation.

A ratio computed from the number of dairy cows that died and the transported total was stated as a percentage for the colder periods (the months of November, December, January, February, March, April) and for the warmer periods (the months of May, June, July, August, September, October). The results made it possible to quantify the seasonal effect on the mortality of dairy cows under transportation to slaughter facilities.

Relative numbers of the dairy cows that perished, expressed as percentages, were likewise computed for Period I (1997 - 2000) and Period II (2001 - 2004). An index representing a ratio of the deceased cow percentages in Period II versus Period I was also computed. The index value greater than 1.00 indicates a growing trend in the dairy cow mortality within the given period, the value of 1.00 indicates a trend where the dairy cow mortality neither rises nor falls within the given period, and the value lower than 1.00 indicates a decreasing trend in the dairy cow mortality within the given period.

Results of absolute and relative frequencies were processed using the statistical calculations module of the Excel software package. For statistical processing of results (χ^2 - test), Unistat 5.1. software was used.

Results

Table 1 shows the number of dairy cows deceased in the course of transportation to slaughter, arranged by travel distance to the slaughter facility. Table 1 shows that the overall rate at which dairy cows died in the process of being shipped to slaughter was 0.038% for the entire period of time under observation. The effect of travel distance on the mortality of dairy cows transported to slaughter became apparent from the fact that travel distances of up to 50 km had the death rate of 0.013%, whereas the long distances of over 300 km exhibited substantially higher rates of up to 0.183%. Clearly, the mortality of dairy cows increases with the distance travelled.

Table 1. Number of dairy cow deaths related to slaughterhouse transportation as a function of distance travelled

Distance (km)	Entire Monitored Period 1997 – 2004		
	Transported (number)	Deceased (number)	Mortality (%)
< 50	713383	95	0.013
51 - 100	231251	92	0.040
101 - 200	120100	165	0.137
201 - 300	33102	48	0.145
> 300	9849	18	0.183
Total	1107685	418	0.038

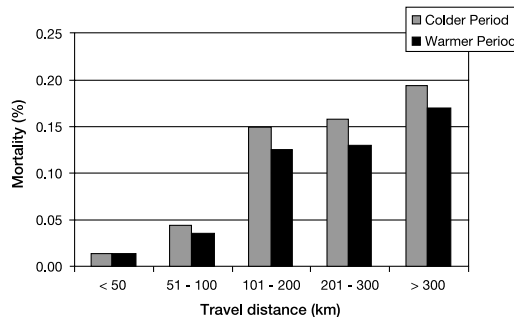


Fig. 1. Number of dairy cow deaths related to slaughterhouse transportation, by colder and warmer season

Fig. 1 shows the number of dairy cows deceased in the course of transportation to slaughter in colder and warmer seasons, listed by individual distance categories. Fig. 1 indicates that season is a factor in the death rates of dairy cows under transportation. Overall, the highest mortality occurred in the colder periods (the months of January, February, March, April, November, December), as opposed to the warmer periods (the months of May, June, July, August, September, October). Therefore, in terms of dairy cows dying in connection with transfers to slaughter facilities, the colder period has a greater negative influence on animal welfare than the warmer period, even if the difference between death rates of transported dairy cows in colder and warmer periods was not significant.

Table 2 shows the trends in the death rates of dairy cows transported to slaughter facilities, in correlation to travel distances. Table 2 shows that the time-related mortality trends, taken as an overall value and individually for different travel distances, are expressed by indices

higher than 1.00. Comparing the 1997 - 2000 period with the 2001 - 2004 period, the mortality rose in all distance categories and the difference was significant (except for travel distances over 300 km). This trend may be characterized as negative.

Table 2. Trends in dairy cow mortality related to slaughterhouse transportation as a function of travel distance

Travel distance (km)	Period I 1997 – 2000			Period II 2001 – 2004				<i>p</i>
	T	D	B	T	D	C	C/B	
	(number)	(number)	(%)	(number)	(number)	(%)	Trend (index)	
< 50	440132	46	0.010	273251	49	0.018	1.72	0.008**
51 - 100	117513	29	0.025	113738	63	0.055	2.24	0.000**
101 - 200	45686	43	0.094	74414	122	0.164	1.74	0.002**
201 - 300	15612	14	0.090	17490	34	0.194	2.17	0.012*
> 300	5731	10	0.174	4118	8	0.194	1.11	0.821
Total	624674	142	0.023	483011	276	0.057	2.51	0.000**

Legend:

T = number of transported dairy cows, D = number of deceased dairy cows during transport, M = mortality, *p* = statistical significance, * = significant ($p < 0.05$), ** = highly significant ($p < 0.01$)

Discussion

Shipment of dairy cows to slaughter imposes a significant stress on the transported animals. According to von Holleben et al. (2003), Mudroň et al. (2005), the stress manifests itself particularly by changes in behaviour, heart rate, and further by changes in the levels of cortisol, glucose, creatin kinase and other indicators. Dixit et al. (2001) mention changes in the secretion of adrenocorticotropin (ACTH) from peripheral bovine lymphocytes. Yagi et al. (2004) registered an increase in the migration capacity of peripheral blood neutrophils in dairy cows as a consequence of transport-related stress. Transport stress increases milk cortisol concentrations (Verkerk et al. 1998), somatic cell counts in milk (Yagi et al. 2004), and faecal cortisol metabolite concentrations (Palme et al. 2000; Morrow et al. 2002; Mostl et al. 2002). Changes also exist in carcass bruising, as noted by Hoffman et al. (1998). A significant stress load imposed in connection with transportation to slaughter may also result in the cattle dying en route. We ascertained that the dairy cow death rate attributable to transportation is 0.038%. This level of mortality is relatively low and confirms a substantially higher resistance of dairy cows to transportation-induced stresses, in contrast to e.g. pigs, where the transportation-caused mortality in the Czech Republic is considerably higher ($0.107\% \pm 0.013\%$), as reported by Večerek et al. (2006).

Dixit et al. (2001), Hoffman et al. (1998), and Villarroel et al. (2003) document the changes in the stress level indicators over long-lasting cattle transports. The rise in the number of deceased dairy cows with increasing distance demonstrates that shipments of long duration elevate the stress levels and lead to a higher mortality in dairy cows transported to slaughter, specifically from 0.013% for distances below 50 km to 0.183% for trips extending more than 300 km.

The discovery of a growing mortality trend in dairy cows transported to slaughter may be characterized as serious. These results prove that the conditions prevailing in the shipments of dairy cows have deteriorated. Worse transportation conditions are reflected in the lower quality of cow carcasses and the resultant meat, as mentioned by Broom (2003), Pištěková et al. (2004), Večerek et al. (2003), and Villarroel et al. (2003).

The statistics of dairy cow deaths may be suppressed by observing the requirements of proper transportation. Noteworthy among those are low-stress cattle-handling techniques (Grandin 1999), and stress-reducing conditions for slaughter-bound dairy cows as formulated for example by von Holleben et al. (2003) with respect to regrouping, loading, transport time, unloading, and lairage time. Wikner et al. (2003) also mention driving performance, handling during loading and unloading, and air quality inside the vehicle.

Úhyny dojnic při přepravě na porážku z pohledu přepravní vzdálenosti a ročního období

Výrazné nedodržování podmínek welfare při přepravě dojnic na jatky se může projevit zvýšenými úhyny zvířat při jejich přepravě.

Cílem práce bylo proto zjistit úroveň úhynů dojnic v souvislosti s přepravou na jatky, zjistit vliv přepravní vzdálenosti na úhyny dojnic, vliv ročního období na počty uhynulých dojnic a zjistit trend vývoje těchto úhynů.

Veterinární inspektoři v České republice v období let 1997 až 2004 sledovali úhyny dojnic v souvislosti s přepravou na jatky. Z celkového počtu 1 107 685 sledovaných kusů dojnic přepravených na jatky v České republice v období 1997 až 2004 uhynulo 418 kusů. Úroveň úhynů u dojnic byla zjištěna 0,038 %. Počet úhynů se však měnil v závislosti na přepravní vzdálenosti na jatky z 0,013 % při přepravě do 50 km až na 0,183 % při přepravě nad 300 km.

Při porovnání I. období (1997 až 2000) s II. obdobím (2001 až 2004) stoupl celkově počet uhynulých dojnic v souvislosti s jejich přepravou na jatky z 0,023 % na 0,057 % (index 2,51), tento rozdíl byl statisticky vysoce významný. Byl tak zjištěn dlouhodobý negativní trend vzestupu úhynů dojnic ve všech přepravních vzdálenostech.

Zjištěné výsledky dokládají poměrně nízkou citlivost dojnic na stresové zatížení způsobené přepravou na jatky projevující se úhyny v důsledku přepravy. Stoupající trend v úhynech dojnic v souvislosti s jejich přepravou na jatky je však varujícím zjištěním, které se týká welfare dojnic přepravovaných na jatky.

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