Survival analysis of time-to-death for on-farm emergency slaughtered cattle in Norway

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Background

- On-farm emergency slaughter (OFES) – on-farm slaughter of injured animals.
- OFES represents 4.2% of all cattle slaughter in Norway.
- Concerns have been raised about animal welfare and food safety of OFES.
- However, proponents of the system say it improves sustainability through meat salvage.

Photo: Clare Phythian

OFES in Norway step-by-step:

The farmer evaluates that an animal is injured → Farmer calls veterinarian → The veterinarian confirms eligibility for OFES and human consumption

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Includes date and time of ante-mortem inspection on certificate → Farmer calls slaughterhouse → Slaughterman arrives

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Stuns and bleeds the animal on-farm → Transport carcass back to slaughterhouse → Register time of death on certificate

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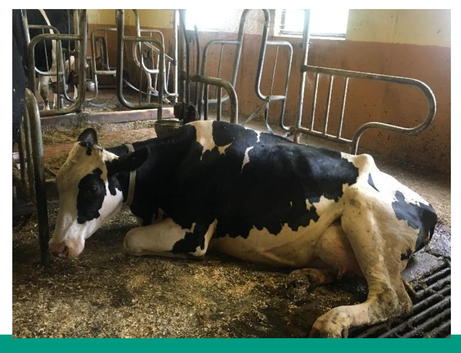
Port-mortem inspection performed at slaughterhouse

This study's aim was to describe the time-to-death from certification for OFES and investigate the difference between reasons of OFES.

Materials and methods

- Records of cattle OFES was collected 4 selected slaughterhouses for the time periods of January, April, July, and October 2018.
- The reasons for OFES were split into 5 main categories and 20 subcategories.
- Kaplan-Meier survival curves were used to describe differences in the time-to-death, for all cases, and split by categories.
- A Cox proportional hazards regression was performed, with reason as the explanatory variable, and a shared frailty effect for the variable slaughterhouse.



Results

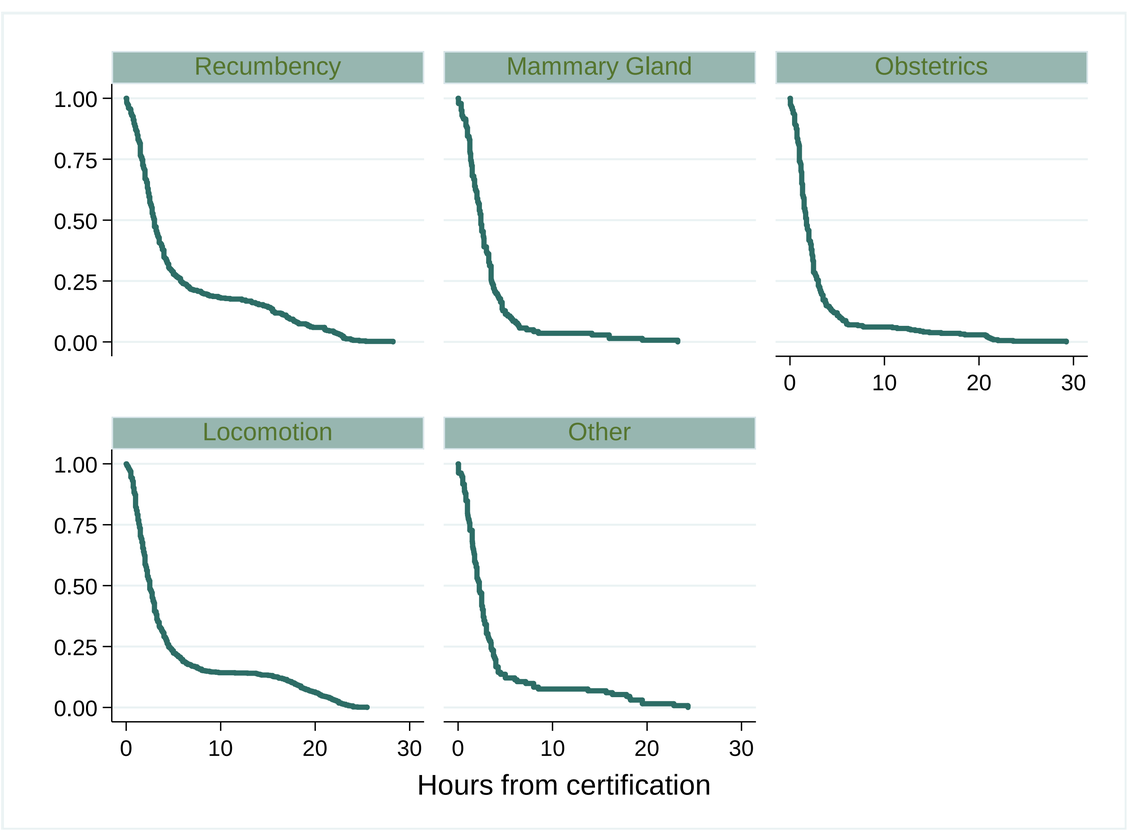


Figure 1. Kaplan-Meier survival function of time-to-death for all cases in the study n=2028, by each category of reason, in separate graphs.

A total of 2028 cases were included in Kaplan-Meier graphs.

Cases stunned and bled by the certifiying veterinarian (n=21) were excluded from the cox model, as they had no wait time.

Table 1. Estimates from a Cox proportional hazards model. The outcome was time-to-death and the explanatory variable was the main reasons of OFES with a shared frailty effect for slaughterhouses (p-value =0.047). Cases where the veterinarian did the killing (n=21) were excluded. The proportional hazards assumption was met.

Variable	Hazard ratio	Std. error	95% CI	P value
Recumbency	Baseline			
Mammary Gland	1.49	0.14	1.16-1.71	<0.001
Obstetrics	1.73	0.12	1.43-1.91	<0.001
Locomotion	1.14	0.06	0.97-1.22	0.02
Other	1.42	0.14	1.10-1.63	<0.001
Theta	0.004	0.004		

Conclusion

- 75% of cases are slaughtered within 4 hours after certification.
- Recumbency and Locomotion cases wait longer than Obstetric, Mammary Gland and Others.
- 5 % of cases wait more than 20 hours after certification.

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