

# Unlocking Surveillance Signals: Identifying Herd Health Risks Through Calf Mortality Trends



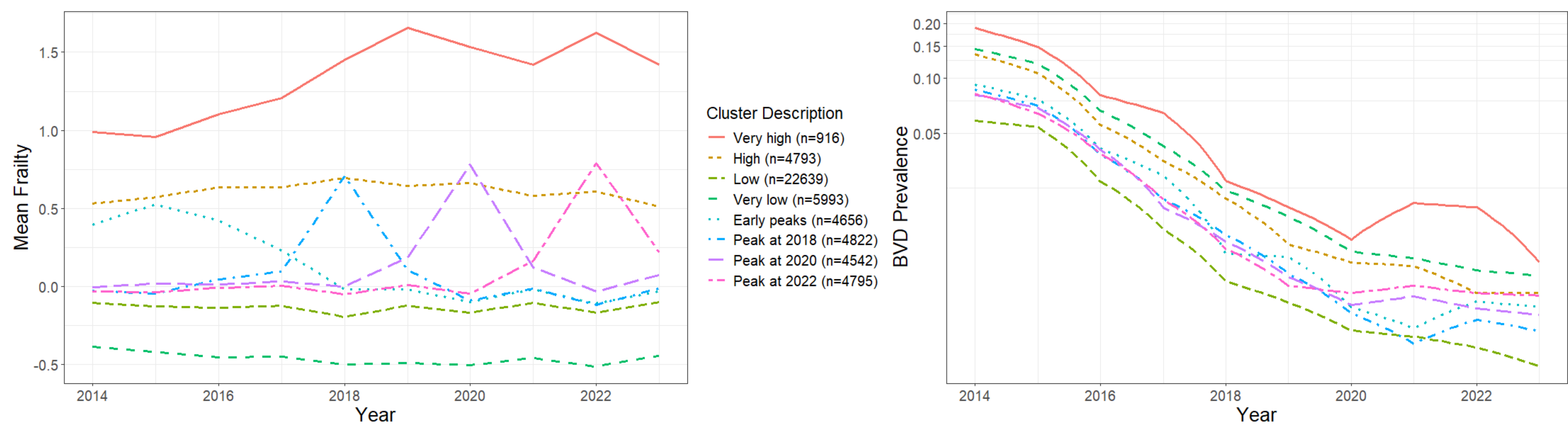
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## STAGE 1: Estimate annual calf mortality hazard in Irish cattle herds

Annual Cox survival models were created for calves born in Ireland in 2014-2023 and right-censored at 100 days. Fixed effects were sex and breed type (beef, dairy, crossbred), while herd was included as a random (frailty) effect.

## STAGE 2: Identify temporal patterns and relate to BVD prevalence

K-means clustering was used on the extracted frailty estimates for each herd and each year. The mean frailty and log BVD prevalence was plotted for the eight distinct clusters.



## STAGE 3: Explore mortality risk as indicator of BVD (re-)emergence

Flagged if the current frailty was greater than:		Flag	Odds Ratio	p-value	Sensitivity	Specificity
1. 5yr mean + (2.33 * 5y SD)		1	1.25	0.0035	10.6%	91.4%
2. 5yr mean + 0.5		2	1.60	<0.001	17.9%	88.1%
3. 1yr mean + 0.5		3	1.45	<0.001	20.8%	84.7%
4. 0.5		4	1.83	<0.001	24.0%	85.3%

## Conclusions

Tracking herd-level calf mortality serves as a detection mechanism for potential disease incursions and animal welfare concerns. This approach will enhance broader syndromic surveillance systems in regions working to eliminate specific livestock diseases and maintain disease-free status.

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