Title	Applying Haddon’s matrix to bovine injury prevention: An example using white line disease
Authors(s)	Messam, Locksley L. McV., O'Grady, Luke, Hanlon, Alison, Somers, Joris
Publication date	2016-07-08
Publication information	Messam, Locksley L. McV., Luke O’Grady, Alison Hanlon, and Joris Somers. “Applying Haddon’s Matrix to Bovine Injury Prevention: An Example Using White Line Disease.” World Association for Buiatrics, July 8, 2016.
Conference details	The 29th Buiatrics Congress (WBC), Dublin, Ireland, 3-8 July 2016
Publisher	World Association for Buiatrics
Item record/more information	http://hdl.handle.net/10197/10211

WBC Abstract Submission

Epidemiology

WBC2016-432

Applying Haddon's matrix to bovine injury prevention: An example using white line disease

Locksley Messam* [1], Luke O'Grady[1], Alison Hanlon[1], Joris Somers[1]

[1]School of Veterinary Medicine: Herd Health and Animal Husbandry, University College Dublin, Dublin, Ireland

Presentation Preference: Oral or Poster Presentation

Objectives: Haddon's matrix is a model used to conceptualize injury occurrence. This model defines injury as energy transfer, by the agent to the host, in quantities or rates exceeding the tolerance of the host's tissue. While this approach has been used in human injury research for over 30 years to identify risk factors and develop preventive interventions, we have not seen it applied to animal injury. Lameness, an etiologically complex condition, is a source of both economic losses and welfare concerns to the cattle industry. We introduce Haddon's matrix as an approach to viewing traumatic animal injury using bovine white line disease as an example.

Materials and Methods: First, we identified three temporally distinct and successive phases of the injury process, each corresponding to a row of the matrix: The pre-event phase (the period prior to the transfer of mechanical energy to the white line), the event phase (the period during which mechanical energy is being transferred to the white line) and the post-event phase (the period subsequent to the transfer of mechanical energy to the white line). Second, we defined four interacting factors that contribute to an injury event, corresponding to the columns of the matrix: The host that sustains the injury (e.g. the cow); the agent, the object that transfers the energy to the host (e.g. a foreign body such as a stone); the overall physical environment in which the injury occurs (e.g. the farm, including the design of housing, floor surfaces and roadways, presence of pasture and herd size); and the socio-cultural environment or context: herd management (e.g. lameness control strategies, methods of herding etc.), cultural practices (e.g. awareness and attitudes to lameness) and animal welfare regulations. Finally, we used each cell of the 3 × 4 matrix as a focus for brainstorming and, guided in part by current literature, identified factors which could potentially a) prevent, b) limit the quantity of and c) reduce the consequences of energy transfer by various agents to the white line.

Results: The matrix enabled examination of factors as they pertained to specific phases of the injury process and thus facilitated evaluation of the feasibility of different phase-specific injury countermeasures. Thus it helped to compartmentalize a seemingly complex problem into manageable segments. Specifically, we found most potentially successful countermeasures applicable to either the prevention of energy transfer (pre-event phase) or the limiting of its consequences (post-event phase). Few event phase countermeasures were identifiable and deemed potentially capable of sufficiently limiting the quantity of energy being transferred to adequately protect the white line from injury. Additionally, each host, agent and physical environment countermeasure could be conceived as temporally consequent to a particular socio-cultural environmental (management) countermeasure. Finally, each host countermeasure, for example improving horn quality, had an analogue at the management level.

Conclusions: Haddon's matrix facilitates clear thinking while preserving a multidimensional approach to preventing white line disease. Given the impossibility of protecting the white line tissue once energy above a certain threshold is released, efforts should be expended primarily to prevent the release of energy in those quantities, and secondarily to reduce its consequences. Management-related countermeasures, being earliest in the causal pathway, are likely to be most influential in preventing white line disease and should take priority as preventive strategies. This is consistent with recent recommendations made by other authors.