

Identifying key factors for the successful application of a One-Health approach at the mining-farming interface

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Background

Much has been published on the merits of the One Health approach but much less on its successful application, particularly with respect to its use at the mining-farming interface, where non-infectious diseases are an issue. Legal battles in this interface drain the economy and are often based on little scientific evidence.

What is One Health?

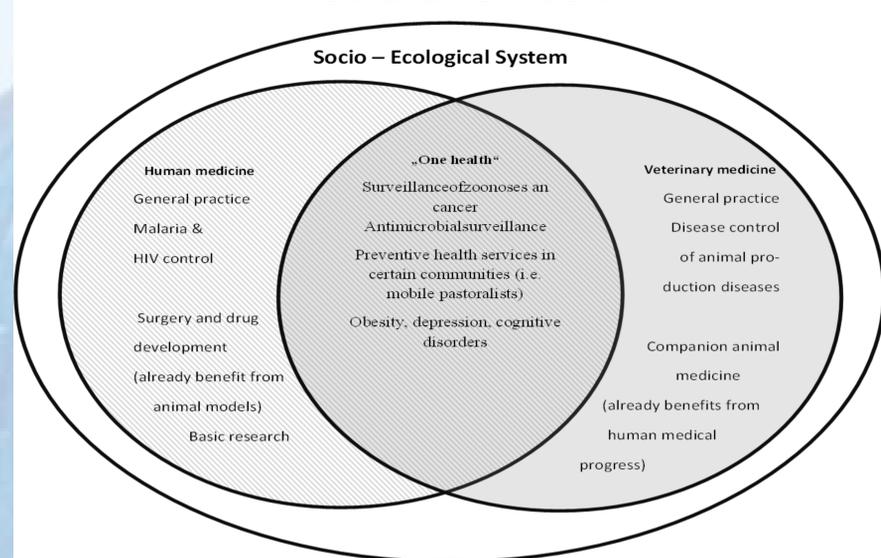


Figure 1

From: Zinsstag et al. (2015) Measuring added value from integrated approaches. In: J. Zinsstag, et al. (Eds) *One health: The theory and practice of integrated health approaches*. CAB International, Oxfordshire, UK.

The Complex Problem

Two unrelated industries (Mining and Agriculture) with differing opinions on the impact of chronic vanadium exposure

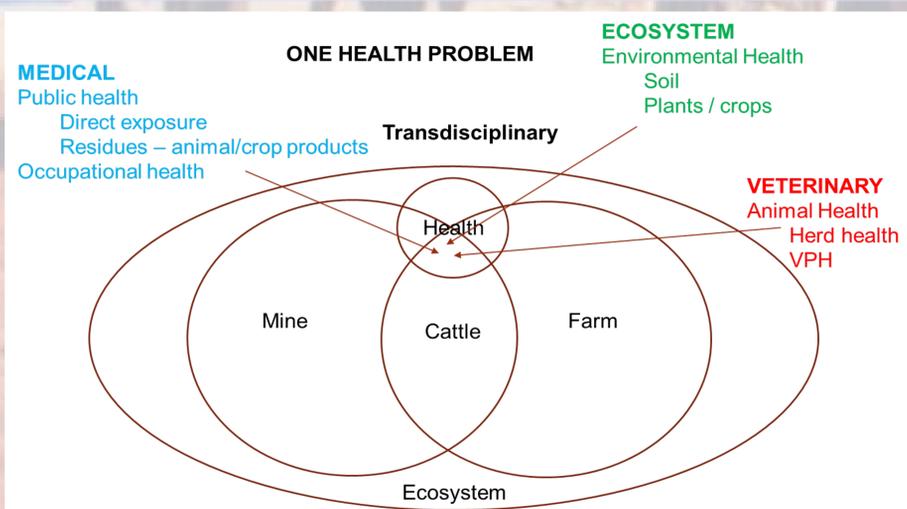
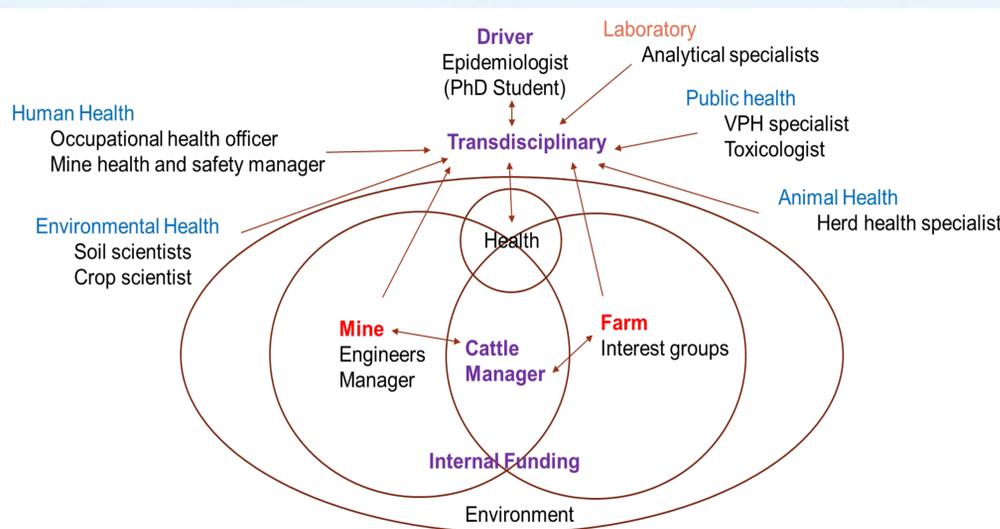


Figure 2 One Health components relevant to the problem illustrating the transdisciplinary segment central to addressing the problem

How to Solve the Problem Methods

A herd health study integrating mine management with independent environmental, public and animal health experts was created to resolve ongoing disputes between the mining and farming industry. A sentinel cattle herd was farmed on mining property surrounding a vanadium mine, but managed by the farming community. The herd was monitored over 7 years for signs of vanadium poisoning and metal residues in conjunction with monitoring of environmental concentrations of heavy metals. The herd served as an early warning sentinel system that was incorporated into the mines pollution control and occupational health strategies and simultaneously facilitated research on chronic vanadium poisoning.



Vanadium Industry : Cattle farming industry

Figure 3 Creating the right transdisciplinary team and ingredients to solve the problem

Key ingredients for a successful One Health approach:

- All parties had a vested interest in solving the problem. The mine was being sued by farmers and it was costing them a lot of money, the farmers were losing cattle and wanted the problem stopped.
- There was a dedicated driver who wanted the project to work for his own personal interests and understood the role of each stakeholder and when to include them within the project. Not all stakeholders were included all the time or from the start.
- The project worked on a true transdisciplinary basis with specialist skills being provided as needed and not through integration of silos
- There was a risk communication tool that all parties had a stake in and could relate to. The mine ran a cattle herd under their management on their property directly adjacent to their mining enterprise with the manager of the cattle being drawn from the community.
- There was a cost to all players - Funding was internal and available to make it work – run on a consultation basis and incorporated into the mines pollution control budget and strategy Cattle used as an early warning system for detecting vanadium.

Results

A One Health approach mitigated against further litigation, which dropped from 5 cases in the 5 years prior to the study to 1 during the period of the study. At the same time extensive information was gathered on the effects of chronic vanadium exposure (Fig. 4) and its public health implications.



Figure 4 Signs of chronic vanadium poisoning in calves

Conclusion

The concept of One Health is intuitive but the successful delivery of One Health requires certain key ingredients (Fig. 3) to ensure successful integration and engagement of the key components (Fig. 1 & 2) of One Health that is required to address complex multisectoral problems