A conceptual study of value chain analysis as a tool for assessing a veterinary surveillance system for poultry in Great Britain

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ABSTRACT

Value chain analysis provides a rational and systematic framework for describing and evaluating the roles and relationships of people and organisations that exist in complex and dynamic systems and networks. This includes understanding the flows of materials and commodities and value-adding activities between the different parts of value chains. Value chain analysis also has people as a primary focus, thereby enabling an understanding of their roles, motivations and behaviours in context with cultural, socio-economic and other drivers.

This study explores the hypothesis, proposed here for the first time, that the utility of value chain analysis can be further extended to enable evaluation of health surveillance systems. The main characteristics of a poultry food system value chain were evaluated first to provide a conceptual framework for the description of a surveillance system value chain. The scanning surveillance system for the detection and early warning of diseases and health threats in poultry in Great Britain was then used as an example, to which a value chain analysis was applied.

The key surveillance value chain commodity was identified as livestock health data and intelligence, which describes and contextualises the health status of the given 'at risk' population. Furthermore, some fundamental asymmetries in the surveillance system value chain have been identified relating to poultry demographics (as the denominator livestock population) and the people, organisations, resource flows, power and institutional environment.

In addition, other insights have been gained enabling the identification of factors that help to understand the behaviours of people, which in turn may influence their decision-making, and may also result in changes to the activities and risk profile and management in the surveillance system value chain, specifically: (i) information-sharing and collaboration; (ii) social capital and trust; (iii) prioritisation and deployment of resources; (iv) the basis for people to engage and participate; (v) cooperation between the public and private sectors, including sharing of responsibility and costs.

This study has shown that value chain analysis provides a robust, systems-based approach that can be used as a systematic framework to evaluate a livestock health surveillance system and the context in which disease and associated surveillance information is placed in the surveillance system value chain by the people, businesses and organisations involved. In addition, this information can be used for decision-support, to manage risk, generate value and ensure that people in the system bear the costs of surveillance and disease management appropriately.

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1. Introduction

Value chain analysis provides a rational and systematic framework for describing and evaluating the roles and relationships of people and organisations that exist in complex and dynamic systems and networks (Bolwig et al., 2010; Haggblade et al., 2012; Hartwich et al., 2005; Rushton, 2009a). This includes understanding the flows of materials, resources, commodities and value-adding activities between the different parts of value chains (Rushton, 2009b). Value chain analysis (VCA) also has people as a primary focus. Therefore, the roles, motivations and behaviours of people within value chains may be understood with consideration of their cultural, social, economic and personal beliefs and needs (Rushton and Leonard, 2009; Rushton et al., 2009).

Importantly, value chains are characterised as being demand-led (identified consumer requirements 'pulling' activities downstream) and collaborative with interdependencies, including the internal business enterprise and external regulatory and policy environments (FAO, 2011; Porter, 1985; Porter and Millar, 1985). This expands the principles of supply chains which focused on

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'pushing' materials and products downstream from the supplier and realising capital flows upstream (Mangan et al., 2012).

Veterinary surveillance is taken to mean the systematic, ongoing measurement, collection, collation, analysis, interpretation and timely dissemination of animal health related information and data to those who need to know so that action can be taken (OIE, 2014a). These actions may include planning, implementation and evaluation of disease control measures (Toma et al., 1999). This implicitly requires a 'veterinary surveillance system', which can be defined as a method of veterinary surveillance that involves one or more components (or activities) that generate information on the health or disease status of animal populations (OIE, 2014b).

One example of this is so-called early warning surveillance (EWS). In Great Britain (GB), EWS is characterised as enhanced scanning surveillance, formerly known as passive surveillance (Hoinville et al., 2013). The principle aims of this scanning surveillance system are to detect: (i) new or re-emerging threats; (ii) changes in the patterns of known diseases in livestock and wildlife species (AHVLA, 2012a, 2012b). This is carried out by the Animal Health and Veterinary Laboratories Agency (AHVLA) in England and Wales, in partnership with SAC Consulting (SACC) in Scotland. Both organisations work closely with private veterinary surgeons (PVS) and livestock owners, keepers and industries. These activities are mainly funded by Government with taxpayer revenue supporting functions and services that are public goods (Rushton and Leonard, 2009). Livestock owners also pay for goods and services provided by AHVLA and SACC as part of this surveillance system.

Recently, this surveillance system has undergone a number of reviews and also faces a number of challenges, including future sustainability (AHVLA, 2011a, 2012a, 2012b, 2013; Defra, 2011; Scottish Government, 2011). It is therefore relevant to consider the need for a systematic analytical approach that enables qualitative and quantitative description and assessment of the surveillance system as a whole.

VCA has been commonly used as an approach to describe and evaluate food systems, as well as for supporting livestock disease management strategies (FAO, 2011). Three core analytical steps have been described (Rushton, 2009b), namely:

1. Describe and map the value chain (based on an identified commodity or product and associated consumer demand).
2. Identify and, if possible, quantify important activities and people including the routes and direction of 'flows' in the value chain map.
3. Assess the value chain through description and evaluation of the profitability, power and institutional environment of key people in the value chain.

This study explores the hypothesis, proposed here for the first time, that the utility of VCA can be further extended to enable evaluation of health surveillance systems, using the scanning surveillance system for the detection and early warning of diseases and health threats in poultry in GB as an example.

2. Materials and methods

Evaluation of the utility of VCA as a tool for the assessment of a poultry surveillance system in GB was based on the application of the three analytical steps of VCA described previously (Rushton, 2009b). This study was carried out in four linked phases as described below. As part of this, information describing poultry demographics in the United Kingdom (UK) and the poultry surveillance system in GB was gathered from a number of complementary data sources. These included the Department for Environment, Food and Rural Affairs (Defra) and the UK Devolved Administrations (DAs), AHVLA, SACC, the Royal College of Veteri-

nary Surgeons (RCVS) and publically available literature. In addition, expert opinion was elicited through interviews with veterinarians and staff from AHVLA and SACC, selected pharmaceutical companies, poultry producers and specialist poultry veterinarians with duty of care for integrated poultry companies of the chicken, turkey and duck and goose supply chains and the game bird sector in GB.

2.1. Selection and qualitative description of a poultry food system to provide a model value chain

Different poultry food systems in the UK were identified based on assimilation of information collated from the primary and secondary data sources described above. Poultry industry statistics were sourced from the Great Britain Poultry Register (GBPR), official data describing UK agriculture during 2010 (Defra, 2010) and Defra's website (https://www.gov.uk/government/collections/poultry-and-poultry-meat-statistics). One poultry food system was selected and described qualitatively in the format of a vertical value chain map (Rushton, 2009b). This provided a framework for evaluation of the component parts of the food system based on the principles of 'vertical' and 'horizontal' alignment and categorisation (Bolwig et al., 2010; Haggblade et al., 2012).

2.2. Development of a 'categories matrix' as a basis for comparing value chains

The people, businesses and commodities in the poultry food system value chain map were respectively grouped in horizontal strata to identify one summary supply chain category for each level. In turn, summary descriptors were assigned for the different components that make up the food system value chain. These descriptor categories of value chain components were then aligned with the relevant horizontal levels of supply chain activities in a simple matrix format to provide a high-level summary of the poultry food system. The people, businesses and commodities that make up the activities of a surveillance system value chain were then identified. These were matched side-by-side with the relevant 'horizontal' supply chain category to populate the categories matrix.

2.3. Description and mapping of the poultry surveillance system value chain based on the conceptual framework that has been developed

The summary elements of the poultry surveillance system value chain that were identified when populating the 'categories matrix' were used as the basis for more detailed characterisation and qualitative description. This included consideration of the relevant people and organisations and resource flows involved, and the production of a value chain map of the poultry surveillance system in GB.

2.4. Evaluate the requirements for performing VCA on the poultry surveillance system

The requirements to enable VCA of the poultry surveillance system value chain were evaluated based on the value chain map. Information about the institutional environment, rules and governance of the current surveillance value chain and descriptive statistics relating to the GB poultry population (denominator livestock population) and contemporary AHVLA and SACC scanning surveillance laboratory submissions were also gathered – as below. Assessment of the profitability of the people and the efficiency of the surveillance system were outside the scope of this conceptual framework study.