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Participatory diagnosis and prioritization of constraints to cattle production in some smallholder farming areas of Zimbabwe

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ABSTRACT

A participatory epidemiological study was conducted to identify and prioritize constraints to livestock health and production on smallholder farms in Sanyati and Gokwe districts of Zimbabwe. Questionnaires were administered to 294 randomly selected livestock owners across the two districts. Livestock diseases (29% of the respondents), high cost of drugs (18.21%), weak veterinary extension (15.18%), inadequate grazing (13.60%), inadequate water (13.54%), and livestock thefts (10.44%) were the major livestock health and production constraints identified. The number of diseases reported varied ($P < 0.05$) with livestock species and nature of causative agent. Out of the 36 diseases mentioned by farmers, 50%, 22.2%, 19.4%, 5.5% and 2.8% were diseases of cattle, sheep and goats, domestic chicken, donkeys, and guinea fowls, respectively. Seven (19.4%) of the 36 diseases including rabies and foot and mouth disease were those listed by the OIE. Thirty-four percent of the respondents rated bovine dermatophilosis as the most important livestock disease. Respondents rated, in descending order, other diseases including tick borne diseases (21%); a previously unreported disease, "Magwiriri" or "Ganda renzou" in vernacular (14%); mastitis (11%); parafilariosis (11%); and blackleg (9%). Cattle skin samples from "Magwiriri" cases had *Besnoitia besnoiti* parasites. Overall, this study revealed factors and diseases that limit livestock production in Zimbabwe and are of global concern; in addition, the study showed that the skin diseases, bovine dermatophilosis and besnoitiosis, have recently emerged and appear to be spreading, likely a consequence of ectoparasite control demise in smallholder farming areas of Zimbabwe over the last 15 years.

1. Introduction

In Zimbabwe, 80–90% of the livestock population is in the smallholder farming areas (Njagu, 2011). Smallholder livestock production is a major food security contributor at the household level to more than 75% of the population of Zimbabwe (Agrisystems, 2000). Livestock contribute products for home consumption and use such as milk, meat, hides, skins and manure. In addition, surplus livestock products are sold to generate income that enhances household food security (Perry et al., 2003).

Despite the large livestock population in the smallholder farming areas, livestock productivity is low (Ngongoni et al., 2006; Ndebele et al., 2007). The most frequently reported constraints include shortage of feed and water, high incidence of diseases and mortality rates, and weak veterinary extension (Masama et al., 2003; Masikati, 2010; Mutibvu et al., 2012). Over the last 15 years, there

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has been anecdotal evidence that livestock production in smallholder farming areas of Zimbabwe has further been adversely affected by agrarian and land reforms, and economic calamities characterized by hyperinflation and consequent high prices and interest rates. This has led to emergence of new challenges and constraints to animal health and production; for example, farming systems, ownership and use changed while livestock productivity and disease control in smallholder farming areas deteriorated (DVS, 2001; Njagu, 2011).

Although there is anecdotal evidence of worsening constraints to livestock production and inadequate disease control in some smallholder farming areas of Zimbabwe, few studies have been conducted to establish these claims, particularly the demise of disease control in predominantly livestock production areas such as Sanyati and Gokwe districts. Consistent with this need, and to assist disease control and surveillance programs, the objective of this study was to broadly determine the constraints facing smallholder livestock producers, and, in particular, establish prevalent diseases in Sanyati and Gokwe districts of Zimbabwe.

2. Materials and methods

2.1. Study site

Details of the study site, cattle breeds, and animal health management are described in Pedersen (1997), Chatikobo et al. (2004), and Chatikobo et al. (2009), respectively.

2.2. Composition of the appraisal team

The appraisal team consisted of a veterinarian, an economist, a biostatistician/epidemiologist, and a geographical information systems (GIS) specialist. Most of the team members had training in participatory rural appraisals. To allow for effective triangulation and benefits from multi-disciplinarity, the four experts were considered to have adequate technical rigor for the study (Catley, 1999).

2.3. Sample size determination

From a small pilot study, it was estimated that approximately 90% of households encountered constraints to livestock production. Based on a sample estimate within 5% of the true population proportion, sample size was determined using the formula:

$$S = \frac{Npq}{(CI^2/4)} + pq$$

where S is the desired sample size; N is the number of registered stock owners (households); p is the proportion affected (90%); $q = 1 - p$ (10%); and CI is the confidence interval (5%).

2.4. Sampling procedure

A multistage sampling procedure was used to select participants for the survey. One out of six ectoparasite control dip tanks (16.67%) in each farming system listed by the District Veterinary Officer was randomly selected for the study. At each dip tank, respondent livestock owners were randomly selected from the livestock-card register supplied by the Veterinary Extension Assistant. The selected participants were interviewed as a single group at individual dip tanks.

2.5. Data collection

Data collection took place between1999 and 2003. Participatory Rural Appraisal (PRA) was carried out as described by Catley (1999). Briefly, secondary information was collected, focus-group discussions convened, and proportional piling and belt transects were used. Key informants were interviewed to obtain an overview of the community under study, and to identify decision making structures, and appropriate interview strategies. They were interviewed 2–3 times during the early stages of the study, and later on, the information provided by the key informants was verified in livestock owner interviews. The key informants interviewed included District Veterinary Officers, Local Veterinary Extension Assistants, Traditional Chiefs, Councilors, District Administrators, Village Heads, and experienced farmers. All interviews were semi-structured.

2.5.1. Informal interviewing

a. Checklist. During the semi-structured interviews, a checklist of important points and exercises to be covered was used. The checklist serves to provide overall direction and assure that no major points will be missed in an interview. It also allows respondents to digress into areas of special interest to them and for the interviewer to follow-up specific issues raised by respondents. These digressions often reveal useful information that could be missed in a fully structured interview.

b. Brainstorming. One brainstorming/group interview session was held with participants at each selected dip tank. After the formalities of greetings and introductions, brainstorming sessions were started by asking a general question about current livestock problems encountered by the farmers in their herds. Respondents were asked to list, describe, and rank the constraints. They were further requested to temporally rank the constraints, particularly disease prevalence, if diseases were a constraint.

c. Triangulation. Reports or data provided by various key informants and results of brainstorming were compared and, if inconsistent, were further debated until a consensus view or agreement.

d. Proportional piling. A slight variant of the proportional piling method described by Jost et al. (2007) was used to determine farmers' prioritization of livestock production constraints. Once the respondents and the appraisal team had compiled a list of animal health problems for a particular species, circles were drawn on the ground