investigation into personal hygeine and infection with *Cryptosporidium parvum* in a teaching facility in The california central valley

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Abstract

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1 Introduction

C. parvum is a protozoal parasite that can infect the intestinal tract of over 70 species, [1] including humans. It is an important human pathogen, with 8,269 cases reported in the USA in 2005, commonly in in patients without normal imune systems, such as the young, old and immunocompromised (e.g. AIDS patients) [2]

Because of the cross infection of *C. parvum*, Cattle are an especially important source of human infection in Calfornia, where there are over [3]

age of calf is strongly associated with the probability of shedding *Cryptosporidium parvum* [4]. precence of young calves , e.g. in dairy where young calves are present year round allows constant transmisison and constant en-

demic infection .[5] environmental effects oocyte survival and during hot dry conditions oocyts survive for less, although this may be altered by physical location - e.g. within moist cow pat. [6] association of cattle and drinking water contamintaion with *C. parvum* oocyst has been documented [7]

It was hypothesised that ranchign families experience higher levels of *C. parvum* exposure through direct and indirect contact with cattle faeces.

This study has two objectives as follows. Objective one is to measure the Incidence density rate of cryptosporidiosis in ranching households by comparing with similar, non ranching households. The study hypothesis for this objective is there is a higher incidence of cryptosporidiosis in ranching households due to occupational exposre. Objcetive two is to identify risk factors assocaited with cryptosporidiosis in ranching families, by comparing the incidence or cryptosporidiosis in ranching hosueholds with different levels of occumaptional, dietry, and household factors. The study hypothesis for this objective is some ranching families are at higher risk of cryptosporidiosis due to occupational, dietry and household factors.

The unit of study for both objectives is the household, and the outcome is incidence of cryptosporidiosis in cases per unit time.

2 Methods

The study population was ranchers in california ranchers were identified from USDA databases of active ranching operations having sold cattle in the pre-

vious 12 motnhs. This sample (n=1923) was mailed a letter explaining study design and purpose, and a brief return questinoare to expres interest in participting and basic demographic data The high return rate for this initial letteer (n= 1203, XXXX %) demonstrates the willingless of ranchers to participate, and the effectivnenss of previous extension efforts to riase awareness of this important zoonotic disiase. The initial demographic data gathered included household paramaters (compposition - number children, number hours spent working on ranch by primary worker) ranch factors collected in the inital survey included racnch location, size, number of animals sold in previous 12 months, and normal saclving start date.)

based on these inital responses, a nurse practitioner organised a mutually agreeable time to visit ranching properties, at least 2 months before CSD. For each study area the nurse practitioner was selected from the local bush nursing facility, and where possible preference was given to those that had been in the community for the longest period of time.

during this inital visit the nurse practitioner dropped off faeces collection materials and prepaid return envelopes to failitate sample detection in symptomatic individuals. theses smaples were mailed to the CAHS lab at UC Davis for IFA and DNA isolation, as described in [8]

During this visit the NP sought to confirm as many of the details collected in the inital questionare as possible, as well as gather information regarding the property organisation, (is the ranchers home located on same block as cattle working facility) These questiounares included items listed in table

1 also included recreationsl pursuits such as swimming, fishing, skiing on local water bodies, and any hiking activities precence of a pool on premesis as some *Cryptosporidium parvum* strains have been shown to be chlorine resistant, especially in poorly sanitised pools [9]. source of drinking water (well, recovered rain water, other)

number of children under age.. how many hours spouse and children spent assisting primary rancher

stocking rate was calculated for all animals and for animals under 4 months of age.

cases of intestinal discomfort, fever, and diarrhoea were self reported by ranching families, and confimred with IFA and DNA isolation on stool sample to confirm *Cryptosporidium parvum* was the causitaive agent. Study participants names were also searched in local medical databases to detect any cases that went unreported. 15 cases in the exposed group and 18 in the unexposed group were identified in this way.

No matching was undertaken due to the sparsity of study population with respect to predictor variables. Blinding NP was unneccecary as at the time of interview, the case outcome of each family was unknown.

Where possible, stocking rates were confirmed by crossreferencing sales records with property registration records

inclusion criteria any immuno compromised people were excludedd from the study any without complete record.

2.1 Statistical Evaluation

hed level random effect.

3 Results

During the study period there were XXXX cases of crypto sporidiosis confirmed by fecal IFA, giving an overall incidence density rate of XXXX per 100,000 person years. This high incidence rate contrasts with the general population (CITATION) Within the ranching comuunity, there were various risk factors identified for cryptosporidiosis , as listed in Table 2.

4 Discussion

this study improves on previous by including region specific climate data [10] to predict oocyte survival.

reducing calving season length will reduce likelyhood of infection, and is also better for pasture utilisation and overall operation efficency (CITE)

4.1 Strengths and Limitations

using the same lab for all test ensures internal validity Using a nurse practitioner known to the local community rather than a foriegn researcher improves quality of resposnses by facilitating trust between study participants and data collection point. people are more likely to share true informa-

tion with someone they see at the postoffice weekly, and in turn the nurse practitioner will already have a wealth of information about local families and ranching properties, and can use judgement when deciding accuary of responses The physical visit by nurse practitioner greatly imporves data quality. during this visit she was able to inspect and objectively record property layout, water sources, precence of pool on property which imporves the wuality of exposure measures. the use of county medical records to confirm cases where medical attention was sought improves the accuracy of outcome measurement, although the majority (n=XXX) of cases were only confirmed through IFA on submitted fecal samples, a demonstration of the average ranchers stoicness and difficulty in accessing medical care in remte rural communities.

5 Figures

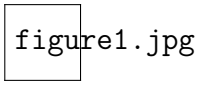

Figure 1: Flow Diagram showing proposed Biological Rationale for study, including exposure, outcome and covariates

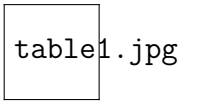

Figure 2: Characteristics of study participants and sample size calculations.

Figure 3: Odds Ratios (OR) for the association between uveitis and *Bartonella sp.* infection status, age, housing status and geographical location.

Figure 4: Sample size function and calculation output from R. Calculations agrees with Epi Info when continuity correction was applied.

References

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