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Date of Submission	**Research Area**	**Serial Number**

Section One: General Information

Title of the Research Project:

Socio-economic Aspects of Brucellosis in Khartoum State…

Title in Arabic:

النواحى الاقتصادية والاجتماعية لمرض البر وسيلا بولاية الخرطوم .

College: Veterinary Medicine and Animal Production

Department: 1- Development Studies & Extension.

2- Fisheries and Wildlife Biology.

Project Language	Project Duration	Project Budget
English	2 years	33000 SDG

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Participant Researchers:

S	Name	Institution
1	Hamid Agab	College of Veterinary Medicine & Animal Production, SUST.
2	Adil Abdelrhman Ali	National Health Laboratory, Khartoum

Head of the Research Unit:

Name: ………………………...... Signature: …………… Date: ………….

Dean of the College:

Name:**Dr. Seif Ed-Dowla M. Barakat** Signature: ……. Date: ………...

Section Two: Project Description

1. Summary:

The aim of the project is to highlight the importance of brucellosis as a zoonotic disease. Emphasis will be focused on the   economic impact of the disease on dairy sector together with its impact on the producers and consumers of animal products in Khartoum State.

Based on the previous (secondary data) economic losses due to the disease in some selected farms will be assessed.   Farmer's attitude towards disease control will be investigated. Positive cases of human brucellosis arrived at Khartoum State clinics will be identified. Accordingly the burden of the disease will be assessed both in monetary and non-monetary measures.

2. Justification of the Research Project:

Decision making process and setting priorities need to be built on concrete basis. Analyzing the current situation of the disease from socio-economic prospective will give clear idea about the impact of the disease. Accordingly, formulation of long-term control strategies, in both dairy and health sectors can be made.

3. Goals:

Alleviate poverty, improve human health and welfare through identifying the socio-economic impact of animal and human brucellosis in Khartoum State.

4. The objectives of the Research :

A. The main objective:

To study the socio-economic impacts of brucellosis.

B. Specific Objectives:

* To estimate losses due to animal brucellosis.

*To outline the different possible alternative control strategies based

   on producers attitude.

*To estimate the burden of the disease on human population.

5- Research outcome:

1- Financial loss due to animal brucellosis estimated.

2- Economic importance of the disease among the producers
highlighted.

3- The best control strategy based on producer's attitude identified.

4- The situation of human brucellosis in the state analyzed.

5- the burden of the disease on human population estimate.

6. Literature Review

Brucellosis is one of the world's major zoonosis (Boschiroli *et al*.,
2001). The disease is produced by bacteria of the genus *Brucella*
(Bercovich, 2000). They are gram-negative facultative intracellular
coccobacilli. Seven members of this genus are recognized, of which four
species are known to produce the infection in humans (Alton *et al*.,
1988). Brucellosis is transmitted from animals (Cattle, Sheep, Goats,
Pigs, Camels and Buffaloes) through direct contact with blood, placenta,
fetuses or uterine secretions (Geoffrey *et al*., 2002) or by consumption of
infected animal products, particularly unpasteurized raw-milk or fresh
cheese from contaminated milk (al-Eissa *et al*., 2002). High-risk groups
include those exposed through occupation in contexts where animal
infection occurs, such as slaughterhouse workers, hunters, farmers and

veterinarians (Robinson, 2003).

Brucella infection is endemic in human and livestock in the Mediterranean countries (Perez-Avraham, *et al*., 2001; Lithg-Pereira *et al.*, 2001). It is also present in Asia, sub-Saharan Africa, and Latin America (Abu Shaqra, 2001; Mikolon, 1998).

The disease poses a barrier to trade of animals and animal products (Fitcht, 2003) and has a wide socioeconomic impacts especially in countries where rural income relies to a large extent on livestock breeding and dairy products (Zinsstag *et al*., 2004). Brucellosis is responsible for economic losses due to abortion, infertility and drop in milk production (Garin –Bastuju, 2003).

The Center for Disease Control and Prevention (CDC) lists *Brucella* as a possible bio-terrorist agent; however, it has never been successfully used in this manner .The center also classifies *B. abortus, B. melitensis* and *B. suis* as "agents of mass destruction" and as category

B-organisms (Elzer, 2002).

The control of the disease depends on the system of animal management (Musa, 2004). The approach for control, prevention, or eradication of brucellosis in a country or region depends on many factors, such as the level of infection in the herds or flocks, type of husbandry, economic resources, public health impacts, and potential international trade implications. Decision-making by those charged with policy-making is likely to be intuitive unless accurate and current epidemiological information is available (Robinson, 2003).

In Mongolia, Roth *et al*. (2003) studied the impact of animal vaccination on human health. They adopted cost-effectiveness and economic benefit for human society and the agricultural sector of mass vaccination against brucellosis. Cost-effectiveness, expressed

as cost per disability adjusted life year (DALY) averted, was the primary outcome. The result obtained was 49027 DALYs could be averted in the scenario of 52% (reduction of brucellosis transmission between animals achieved by mass vaccination). Estimated intervention costs were US$ 8.3 million, and the overall benefit was US$ 26.6 million.

In Sudan, Angara (2005) studied the socioeconomic aspect of brucellosis in Kuku Dairy Scheme in 2004, the total cost of the disease in both dairy and health sectors was found to be 65833570 SD out of which 65617120 SD was the cost of the dairy sector and 216450SD was the cost of health sector. The burden of the disease was measured in DALYs. In the year 2004, 7.1 and 14.1 years were lost if the disease is associated with level 0.1 and 0.2 disability weights, respectively.

7. Key Words:Brucellosis / socio economic / control strategy/ Khartoum State.

8. **Methodology**:

Study area: Khartoum State –Sudan**.**

Study subjects:

1- Animal production units of different species, raised at Khartoum State.

2- Positive brucella cases visiting Khartoum State clinics.

Study design : Descriptive, Cross-sectional , analytical study.

Sample size and design:

1- Animal production units:

Based on secondary data available on the holdings infected.

A sample from them will be selected.

The number of holdings will be calculated as follows:

$1/n = 1/nX + 1/N$

Where nX is the sample size tabulated

n=sample size

N=Total number of holdings

Following the FAO guide.

Human population:

Positive brucella cases visiting Khartoum State clinics.

Method of data collection:

Data on the number, breed and the age of each infected animal will be identified. Number of aborted and repeat breeder cows also will be identified by using questionnaire sheet. Producers will be interviewed.

Positive cases of human brucellosis arriving to clinics during a period of 6 months will be followed. Data on their sex, age, occupation, duration of the disease and cost of treatment will be collected from each patient by interview.

Data analysis;

For estimating the cost of the disease in dairy sector partial enterprise budget will be used.

For estimating the cost of the disease in health sector. The cost of treatment will be estimated in monetary term and the burden of the disease will be measured in DALYS.

For disability adjusted life years (DALYS) will be calculated following (Fox-Rushby, J. 2002) the YLL (years lost as result of premature death) part of DALYS formula was omitted because the disease is not fatal.

$$DALYS = YLL + YLDs$$

$$YLL = \frac{KCe^{ra}}{r}\{ e^{-(r+)(L+a)}\{ -(r+\beta)(L+a)-1\} - e^{-(r+\beta)a}\{ -(r+\beta)a-1\}\} + \frac{1-K}{(r+\beta)^2}(1-e^{-rL})$$

$$YLD = DW\{ \frac{KCe^{ra}}{}\{e^{-(r+\beta)(L+a)}\{-(r+\beta)(L-a)-1\}-e^{-(r+\beta)a}\{-(r+\beta)a-1\}\}+\underline{1-K}(1-e^{-L})\}$$

$$(r+\beta)^2$$

Given:

a = Average age at onset of the disease (years) .

r = discount rate (usually 3%).

β = age weighting constant(e.g. β =o.o4).

K = age weighting modulation constant (e.g. K= 1).

C = adjusting constant for age-weights (e.g. C= 0.1658).

L = average duration of the disease = 3 years

DW = disability weigh 0.2 ,0.1.

(Fox-Rushby, J. 2002)

Farmers attitude towards control of the disease in livestock and how much they are willing to accept (WTA) for their brucellosed animal will be examined. Data in this respect will be collected using structured questionnaire; contingent valuation method will be used for the analysis.

Data Management and Statistical Analysis:

SPSS and Eco-zoo programmes will be used for analysis of data**.**

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Section Three: Researchers and their responsibilities:

Researchers	Main Specialty	Academic status	Qualification	Responsibilities
1. Tamador Ellkhansaa Elnour Angara	Public health Economics	Assistant Prof.	Ph.D. Public health Economics	1-Guidance & supervision of the work.. 2- Document writing.

2. Hamid Agab	**Epidemiology of Brucellosis**	Associate Prof.	Ph.D.	1- Supervision of field work of animal brucellosis. 2-Document writing.
3. Adil Abdel Rahman Ali	*Brucella* Specialist	Researcher	M.Sc.	1- Supervision of field work of human brucellosis. 2-Document writing.