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Farmers Competencies on Identification of Lumpy Skin Disease Causes Symptoms and Management Practices in Mafikeng Municipality of North-West Province, South Africa

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Abstract: This study has presented the trend of Farmers' competencies on identification of lumpy skin disease causes symptoms and management practices in mafikeng municipality of North-West Province South Africa. A large sample size technique of n≥30 was used to select livestock farmers and a structured questionnaire which was designed based on review of related literature and objectives of the study was used to collect data from the sample. The results on the personal characteristics of farmers shows that 63.3% of the respondents were between 20-30 years age bracket all are male at least 93% of the respondents had formal education albeit at primary and secondary school levels only about 47% had between 11 and 20 years farming experience 77% had their farms ranging from 20-30 km to the nearest city at least 40% had farm size >100 ha and at least 72% of the respondents had 50 cattle per herd size. About 67% of the respondents indicated that they use dam while the remaining 33% rely on rivers in the study area. Respondents indicated that the mosquito is a popular LSD vector and 97% did not use any control methods. Majority of the respondents indicated that the prevalent symptoms of LSD are lumps on the skin (80%) loss in body condition (80%) loss of appetite (80%) swollen limbs (80%) abortion (80%) and weakness and lesions around and inside the mouth (80%). The most prevalent LSD management methods are the use of antibiotics and anti-inflammatory (73.3%) and vaccination (83.3%). The study recommends improvement in the provision of veterinary extension services in order to curtail the effect of LSD in the study area.

Key words: Farmers, competencies Lumpy skin disease, vaccination, verterinary extension services, South Africa

INTRODUCTION

Lumpy Skin Disease (LSD) is an acute infectious disease of cattle which is characterized by high fever, lymphadenopathy, sudden eruption of multiple circumscribed skin nodules, necrotic plaques in mucosa and subsequent sit fast of the nodules (Woods, 1988). LSD is caused by prototype strain of neethling virus and belongs to the genus *Capripoxivirus* within the family Poxviridae. Sheep Pox Virus (ShPV) Goat Pox Virus (GPV) and Lumpy Skin Disease Virus (LSDV) together make up the capripox group of pox viruses. The morbidity of LSD varies from 3-85% and mortality never exceeds 3% (Woods, 1988). However, severity of the disease depends on the susceptibility of the host. By natural predisposition *Bos taurus* breed is more susceptible than *Bos indicus* breeds and lactating cows appearing to be the most risk (Kitching, 2008).

LSD is a constraint on livestock trade as it causes major production losses notably in high producing exotic breeds (Davies, 1991). This is an Office International des Epizooties (OIE, 2011) listed and a notifiable cattle disease. Epidimiological evidence indicates that biting arthropods such as *Stomoxys calcitrans* and also female mosquitoes of *Aedes aegypti* are involved in the transmission of LSDV (Kitching, 2008; Chihota *et al*., 2001). LSD is signified with the potential for rapid spread and is known to cause severe economic losses by loss of milk production abortions and infertility in males and females (Irons *et al*., 2005).

The economic impact of animal health diseases can be complex and go beyond the immediate impact on the directly affected agricultural producers. In specific cases the actual economic impact will vary depending on factors such as the type of animal disease but the complexity of the effects often make the precise measuring of the

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economic impacts very difficult. The most direct economic impact of animal disease outbreaks is the loss of or reduced efficiency of production which reduces farm income. The severity of the economic effect depends on specific circumstances. If the farm economy is relatively diversified and other income opportunities exist the burden will be reduced. Conversely, if the local economy is heavily dependent on one or a few vulnerable commodities the burden may be severe and local food security impaired (FAO, 2004).

Along with production impacts can bring variations in prices determined by the supply and demand effects induced by animal diseases. Markets effects can similarly induce variations in wages for farm and processing employment and can otherwise spread through to upstream and downstream activities (FAO, 2004). Animal diseases can often have significant negative impacts on food security and nutrition in developing countries. The growth of international trade in agricultural produce buffers the potential impacts of animal diseases on food availability but there can still be major impacts on poorer communities that do not have access to substitute supplies (FAO, 2004).

There are also budgetary implications of animal diseases. Control measures generally involve budgetary outlays. These include costs for inspection, monitoring, prevention and response. Also demands are often put to governments to extend financial assistance to the affected producers. The costs of some of these measures are proportional to the size of the agriculture sector being protected while others are less closely related (FAO, 2004) the attention drawn for the first time by the African Carribean and Pacific/European Economic Community (ACP/EEC) Council of Ministers to livestock farming which stressed in particular the inadequacy of the measures for fixing meat prices and the ensuing effects on the keeping and feeding of animals. Policy issues are at the heart of the livestock problem.

In North-West province, South Africa the beef sub-sector is the next most important sector after mining and contributes around 70% of gross domestic product. Livestock in general acts as a source of income at individual and household levels create employment provide services in support of crop production in terms of draught power and manure used as organic fertilizers in gardens and arable fields. The livestock industry is extremely important to the economy of North-West province in particular and South Africa in general and includes not only commercial producers of meat or milk but also purebred breeders and small producers with a few animals. The success of any type of livestock operation is closely related to the disease level of the animals. A number of complex diseases has emerged, difficult to diagnose and induced by a multiplicity of pathogenic agents causing an apparent or clinical disease which are more likely that the effect will be less obvious and may only reduce the overall productivity of the livestock. There have been reported cases of LSD outbreak in North-West province, South Africa in 2000 and 2010 with several attendant consequences. Many animals were adversely affected and most of the farmers affected complained about low productivity as a result of the disease outbreak. Due to the recurring outbreak of LSD in North-West province, South Africa, it is important to ascertain farmers' competencies on identification of LSD symptoms and their management strategies. The objective of this study is to determine farmers' ability to identify LSD symptoms and management practices in mafikeng municipality of North-West province, South Africa.

MATERIALS AND METHODS

The study was conducted among cattle farmers in Municipality of North-West province, South Africa. The study population consisted of smallholder farms keeping both cattle and small ruminants. Zebu cattle bos indicus and bos taurus and the small indigenous and boer goat are the predominant domestic animal species raised in the district. The Farming system in the district is described as Dual Purpose Cattle Small Scale (DPCASS)/Sheep and Goats Small Scale (SGSS) (Peeler and Omore, 1997). The grazing system is predominantly traditional free grazing (Kinuthia, 2001) but a few farmers practice zero grazing. A large sample size technique of $n \geq 30$ was used to select livestock farmers and a structured questionnaire which was designed based on review of related literature and objectives of the study was used to collect data from the sample. The questionnaire comprised of demographic characteristics, identification of LSD symptoms and management strategies for LSD. The questionnaire was face validated by lecturers in the Department of Agricultural Economics and Extension and Animal health of the North-West University Mafikeng Campus, South Africa. Data collected were analyzed using Statistical Package for Social Sciences (SPSS) with frequency counts and percentages.

RESULTS AND DISCUSSION

The results on the personal characteristics of farmers are shown in Table 1. Table 2 shows the results on the farmers' identification of causes and symptoms of LSD in

Table 1: Personal characteristics of farmers

Characteristics	Frequency	Percentage
Age		
20-30	19	63.3
31-40	10	33.3
41-50	1	3.3
Gender		
Male	30	100.0
Educational level		
Primary	10	33.3
Middle	11	36.7
High	7	23.3
Tertiary	2	6.7
Farming experience		
1-10	13	43.3
11-20	14	46.7
20-30	3	10.0
Distance to the nearest city (km)		
10-20	7	23.3
20-30	23	76.7
Farm size (ha)		
10-100	18	60.0
101-200	5	16.7
200-300	1	3.3
300 and above	6	20.0
Activities in neighboring farms		
Vegetable garden	4	13.3
Cattle farming	9	30.0
Piggery	11	36.7
Poultry	4	13.3
Game	2	6.7
Herd size		
1-50	8	26.0
51-100	11	36.6
>100	11	36.6

Table 2: Identification LSD causes and symptoms by farmers

Presence of water beds	Frequency	Percentage
River	10	33.3
Dam	20	66.7
Control of mosquitoes		
Paraffin	2	6.7
None	28	93.3
Animal drinking points		
River	12	40.0
Dam	10	33.3
Creep	2	6.7
Windmill	6	20.0
Season that LSD is prevalent		
Spring	30	100.0
Age that LSD affects		
All ages	30	100.0
Other livestock that it affects		
None	30	100.0
Lumps on the skin		
Yes	24	80.0
No	6	20.0
Loss in body condition		
Yes	30	100.0
Loss in appetite		
Yes	24	80.0
No	6	20.0
Swollen limbs		
Yes	24	80.0
No	6	20.0
Abortions		
Yes	24	80.0
NO	6	20.0
Weakness		
Yes	24	80.0
No	6	20.0
Lesions around and inside the mouth		
Yes	24	80.0
No	6	20.0
Mortality rate in old cattle (%)		
1-20	24	80.0
20-40	6	20.0
Mortality rate in bulls (%)		
1-20	24	80.0
20-40	3	10.0
40-60	3	10.0
Mortality rate in heifers		
1-20%	30	100.0
Mortality rate in calves		
1-20%	22	73.3
20-40	8	26.7
Morbidity rates in old cattle		
1-20%	30	100.0
Morbidity rates in bulls		
1-20%	30	100.0
Morbidity rates in heifers		
1-20%	25	83.3
20-40	5	16.7
Morbidity rates in calves		
20-40%	26	86.7
40-60	4	13.3

the study area while in Table 3 the results of LSD management practices among respondents in were presented. Table 1 shows that 63.3% of the respondents were between 20-30 years age bracket. This stresses the fact that many young people are involved in cattle production in the study area. All the respondents male. This may be due to the fact that cattle production is male dominated and the fact that cattle ownership is by inheritance is often linked to the male-child in the study area. Gender mainstreaming in livestock industry is relatively a new concept and is gradually being accepted (FAO, 2004). In terms of education at least 93% of the respondents had formal education albeit at primary and secondary school levels only. The low level of education among the respondents would have implications for their competencies and ability to adopt new technologies. About 47% of the respondents had between 11 and 20 years farming experience. This feature would enhance their ability in terms of relating to their environment for the management of cattle over different seasons. Many of the respondents (77%) had their farms ranging from 20-30 km to the nearest city. This will have implications on the degree of cosmopoliteness of the farmers and also accessibility to veterinary services. At least 40% of the respondents had farm size >100 ha. This may be due to the compliance with the carrying capacity required for the herd size in cattle production. The fact that the study area is located in a semi-arid region might also be responsible for the trend of this result. Prominent activities around many of the respondents' farms are catlle farming and piggery. These activities will have serious implications for

Table 3: Management practices of LSD among farmers

Treatments for LSD during the last outbreak	Frequency	Percentage
Antibiotics and anti-inflammatory	22	73.3
Dettol antiseptic	4	13.3
None carried out	4	13.3
Vaccination for LSD during the last outbreak		
Yes	25	83.3
No	5	16.7
Frequency of vaccination		
Yes	25	83.3
No	5	16.7
Medical costs during the last outbreak (R)		
R1-R200	18	60.0
R200-R500	3	10.0
R500-R800	5	16.7
R800-R1000	4	13.3
Cost for laboratory tests during the last outbreak		
R1-R200	30	100.0
Cost for Herd inspection during the last LSD outbreak		
R1-R200	30	100.0
Transport and loading costs for emergency slaughter during the last LSD outbreak		
R200-R1000	30	100.0
Need for extra labor during the last LSD outbreak		
No	30	100.0
Introduction of new animals as result of the last LSD outbreak		
No	30	100.0

bio security and the need to control for LSD. At least 72% of the respondents had 50 cattle per herd size. This shows that cattle farming are a major livelihood among the respondents of the study.

Water supply in pastoral and agro-pastoral areas may be classified as ground and surface water. Ground water includes springs, shallow wells and bore-holes whereas surface water refers to streams and rivers, earth dams and catchments of rain water harvest. In Table 2 about 67% of the respondents indicated that they use am while the remaining 33% rely on rivers in the study area. This has implication for the vector roles since the vectors have a predilection for water bodies, mosquitoes are known for laying their eggs in water particularly stagnant water. Respondents indicated that the mosquito is a popular LSD vector and 97% did not use any control methods. Epidemiological evidence indicates that biting arthropods such as *Stomoxys calcitrans* and also female mosquitoes of *Aedes aegypti* are involved in the transmission of LSDV (Kitching, 2008; Chihota *et al*., 2001). Chemicals are generally only used for treating mosquito larvae when it is easier to treat larger numbers of mosquitoes and the impact on off-target species is reduced. In emergency situations, chemicals may be used on adult mosquitoes to restrict the spread of disease (Kitching, 2008; Chihota *et al*., 2001). The distribution of the drinking points by respondents shows that 40% used water from rivers for their animals while 33.3% used dams and 20% used water provided from government sponsored windmills and 6.7% used water from creeps particularly in intensified farming systems. It was further established that even farmers who have intensified their farming system do send their animals to common drinking bodies like rivers and dams when there is shortage of water in their farms.

The seasonal prevalence of lumpy skin disease distribution in the study area as indicated by the respondents shows the most prevalent season is the spring season. The disease is a viral infection caused by a poxvirus that is transmitted mainly when blood sucking insects like mosquitoes and flies bite the animals. This usually happens at the start of the wet season when most insects start breeding. European cattle breeds get the disease more easily than zebu (humpback) cattle which are more resistant to it (OIE, 2004). All the respondents indicated that LSD affects cattle of all ages. Studies have shown that Lumpy skin disease affect cattle of all ages. Younger ones tend to show more severe signs due to non developed immune system as compared to adult cattle (Merck & Co., 2008) and that it is a peculiar disease of cattle. LSD is caused by prototype strain of Neethling virus and belongs to the genus *Capripoxivirus* within the family Poxviridae. Sheep Pox Virus (ShPV), Goat Pox Virus (GPV) and Lumpy Skin Disease Virus (LSDV) together make up the Capripox group of pox viruses only cattle show the LSD clinical signs. Known sources of infection include permanent swamps from where new outbreaks may start. Outbreaks may be small and isolated or gradually spread to cover large areas of the country and even spread into neighbouring countries affecting thousands of animals. Imported breeds of cattle appear to be more susceptible than local breeds. The disease may be confused with besnoitosis dermatophilosis or ringworm. Some animals in a herd seem to have a natural resistance because only 40-50% of animals show lesions in experimental contagion. After an incubation period of 2-4 weeks the animals develop a fever that could last from 4-14 days, accompanied by loss of appetite hyper-salivation and excessive secretion from the nose.

Majority of the respondents indicated that the prevalent symptoms of LSD are lumps on the skin (80%), loss in body condition (80%), loss of appetite (80%), swollen limbs (80%), abortion (80%) and weakness and lesions around and inside the mouth (80%). Animals with Lumpy skin disease will display skin with scars which thus have a very negative impact on selling of skins and hides. Drie van noted that the loss in body conditions of animals affected by LSD may be attributed to other

primary challenges like rise in temperatures (fever) presence of lesions in the mouth which makes eating of animals a difficult task. Feed nutrients will be spent on fighting the disease and main body functions instead of growth or milk production. The full potential of the animal as well as the feed is therefore not reached and it will take an animal longer to reach the right weight. Similarly animals which are clinically sick tend to lose appetite as a result of elevated temperatures which advocate fever. Loss in desire to eat is the most common sign for animals with fever (Merck & Co., 2008). Davies reported mortality rates of 10-40% in bovines as a result of LSD and even higher have been reported on occasion but the much lower range of 1-5% is more usual.

Majority of the respondents (80%) indicated that mortality due to LSD among bulls heifers and old cattle ranges from 1-20%. This finding agrees with Davies. Similarly, at least 80% of the respondents indicated that the morbidity rate due to LSD infection among bulls, heifers and old cattle also ranges from 1-20%. The morbidity of LSD varies from 3-85% and mortality never exceeds 3% (Woods, 1988). However, severity of the disease depends on the susceptibility of the host. By natural predisposition bos taurus breed is more susceptible than bos indicus breeds and lactating cows appearing to be the most risk (Kitching, 2008).

The results of LSD management practices among respondents in the study area (Table 3) show that the prevalent LSD management method is the use of antibiotics and anti-inflammatory (73.3%) ad vaccination (83.3%). Other farmers opted for a non veterinary recommended usage of dettol antiseptic which they administered intra muscularly in infected animals. Vaccination was carried out at different intervals where some farmers vaccinated only once a year some twice and others three times a year. This helped a lot in that the animals were immune to the disease and the immunity is meant to last for a full year which will require maintenance injections of the vaccine on annual basis. A smaller percentage of 16.7% did not have their animals vaccinated. Not all unvaccinated farms displayed LSD infections.

About 60% of the farmers spent a maximum of R200 and some none for medication of their animals.About 10% between R200 and R500; 16.7% spent between R500 and R800 and 13.3% spent between R800 and R1000. Cattle with lumpy skin disease require administration of sulfonamides to prevent further and secondary infections (Davies, 1991). Other cost incurred by farmers were laboratory tests, herd inspection, transport and loading for emergency slaughter, extra labour and introduction of new animals.

CONCLUSION

This study has presented the trend of farmers' competencies on identification of Lumpy skin disease causes, symptoms and management practices in mafikeng municipality of North-West province, South Africa. The results shows that majority of farmers were between 20-30 years age bracket all are male had formal education had between 11 and 20 years farming experience had their farms ranging from 20-30 km to the nearest city had farm size >100 ha and 50 cattle per herd size.

Majority indicated that they use dam and mosquito is a popular LSD vector. Majority of the respondents indicated that the prevalent symptoms of LSD are lumps on the skin, loss in body condition, loss of appetite, swollen limbs, abortion and weakness and lesions around and inside the mouth. The most prevalent LSD management methods are the use of antibiotics and anti-inflammatory and vaccination. The study recommends improvement in the provision of veterinary extension services in order to curtail the effect of LSD in the study area.

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