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Knowledge, attitudes and practices analysis of farmers on the risk of introducing peste des petits ruminants from Angola into northern communal areas of Namibia.

by

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Declaration

I, Brighton Gorejena, declare that the mini dissertation that I hereby submit for the degree MSc (Global One Health: Diseases at the Human and Animal Interface) in the Faculty of Veterinary Science at the University of Pretoria is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

November 2023

Ethics statement

The author, whose name appears on the title page of this mini dissertation, has obtained the required ethics approval/exemption for the research described in this work.

The author declares that they have observed the ethical standards required in terms of the University's Code of Ethics for scholarly activities.

ABSTRACT

Peste des petits ruminants (PPR) is a highly contagious viral disease primarily affecting goats, sheep, and some wild small ruminants. It is characterized by fever, necrotic stomatitis, gastroenteritis, pneumonia, and mortality. Namibia is officially free of PPR in one zone, not the entire country. The national herd has not been exposed to PPR and is naïve. Thus, an outbreak of the disease is potentially devastating on a socioeconomic level. The closest PPR outbreak was in Cabinda province in Angola. To better understand the risk factors for introducing PPR from Angola, a study was conducted using a knowledge, attitudes, and practices (KAP) survey. The research employed a qualitative descriptive survey design consisting of questionnaires and interviews with 376 communal farmers residing within 10-20 km of the Namibia/Angola border in Namibia's Omusati and Ohangwena regions. The results showed that 84% of the farmers surveyed had insufficient knowledge regarding PPR, while 89% were unaware of its clinical symptoms. Nevertheless, the farmers showed good comprehension of general disease prevention techniques, including vaccination (99%), livestock isolation (85%), quarantine (72%), and regulated animal movements (94%). Additionally, the farmers exhibited awareness of the detrimental effects of disease outbreaks (90%). It was concluded that farmers' knowledge, attitudes, and practices (KAP) in Namibia's surveyed northern communal areas present a moderate risk of PPR incursion. The current surveillance strategies the competent authority implements are deemed sufficient and can be sustained. However, the study recommends enhancing PPR awareness among northern communal farmers, particularly those living near the Namibia/Angola border.

Keywords: KAP study, morbillivirus caprinae, peste des petits ruminants, risk, northern communal areas, goats, border

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Abbreviations

AGID	Agar Gel Immunodiffusion
cELISA	Competitive Enzyme-Linked Immunosorbent Assay
CFT	Compliment Fixation Test
CIEP	Counter-Immuno-Electrophoresis
CRO	Chief Regional Officer
DVS	Directorate of Veterinary Services
FAO	Food and Agriculture Organization
ICTV	International Committee on Taxonomy of Viruses
KAP	Knowledge, Attitudes and Practices
NamLITS	Namibia Livestock Identification and Traceability System
NCA	Northern Communal Areas
NSA	National Statistical Agency
NSR	National Summary Report
OMA	Offices, Ministries and Agencies
PI	Principal Investigator
PPE	Personal Protective Equipment
PPR	Peste des Petits Ruminants
RT-PCR	Reverse Transcription PCR

SADC	Southern African Development Community
SPSS	Statistical Package for Social Scientists
SRM	Small Ruminant Morbillivirus
TAD	Transboundary Animal Disease
VCF	Veterinary Cordon Fence
VNT	Virus Neutralization Test
WOAH	World Organization for Animal Health

CHAPTER 1

1. General Introduction

1.1 Background

Small ruminant production (particularly goats and sheep) is an important farming venture, especially for low-income farmers living in developing countries (Rout & Behera, 2021). Domesticated small ruminants such as goats are adapted to harsh environments, particularly the arid to semi-arid ones that characterize some African countries. They can thrive with minimum space and maintenance requirements (Boyazoglu et al., 2005). In addition, small ruminants provide meat, milk, hides, and organic manure to the livestock farmer. Goats are prolific breeders, being able to increase their numbers in a shorter space of time compared to cattle. Goats are more straightforward to purchase and can be sold easily and quickly, providing a source of wealth and disposable income for their keepers. The other benefit of goats is that many cultures accept them. Therefore, there are no dietary, ethnic, or religious taboos to their rearing or consumption (CSA, 2011; Gillespie et al., 2016; Robertson et al., 2020). Despite these many benefits, goats are threatened by reemerging and emerging diseases. One disease threatening to wipe out the cash cow for low-income farmers is peste des petits ruminants (PPR) (Agoltsov et al., 2022; Dundon et al., 2020).

Peste des petits ruminants (PPR) is an acute or subacute, highly infectious, and highly contagious viral disease of mainly goats, sheep, and some wild ruminants (Niedbalski, 2019). Its synonyms include ‘goat plague’, ‘Kata’, ‘ovine rinderpest’, ‘pest of small ruminants’, ‘pneumo-enteritis complex’, ‘pseudo-rinderpest’, ‘small ruminant plague’ or ‘stomatitis-pneumo-enteritis syndrome’ (Parida et al., 2015). The aetiological agent is *Morbillivirus caprinae* (ICTV, 2023). The incubation period is typically 4 – 6 days but is officially recognized as 21 days (O.I.E, 2021). Peste des petits ruminants (PPR) is characterized by fever, necrotic stomatitis, gastroenteritis, pneumonia, and mortality (Kozat & Sepehrizadeh, 2017). Peste des petits ruminants (PPR) has severe socioeconomic consequences especially when introduced to naïve animals. Therefore, every effort should be made to prevent its introduction into new areas.

The global eradication of PPR by 2030 has been identified as a priority (Parida et al., 2015). The Southern African Development Community (SADC) is currently pursuing this objective, and has developed its own PPR control strategy (SADC, 2012). Namibia is playing its role in the PPR eradication drive and has taken some steps that support the goal of eliminating PPR by 2030 (SADC, 2012). One such step was the development and execution of PPR surveillance strategies to help achieve this common goal. The strategies are contained in the *PPR* Control and Eradication Strategy of 2018 (DVS, 2023).

According to the Directorate of Veterinary Services (DVS) National Summary Report (NSR) of August 2023, PPR has not been detected in Namibia (DVS, 2023). However, it should be noted that neighbouring Angola's Cabinda province and the SADC country of Tanzania have reported disease cases in the past. This presents a potential risk to Namibia, as the southward spread of PPR in Angola is possible.

Since PPR has never occurred in Namibia, the sheep and goats in Namibia are naïve to the PPR virus. Being a transboundary animal disease with high morbidity and mortality, PPR can cause severe socioeconomic impacts in Namibia in the event of an incursion. In 2018, the Omusati region of Namibia had 18 515 sheep and 211 411 goats, and the Ohangwena region had 2 793 sheep and 317 699 goats. The Northern Communal Areas (NCA) had 245 189 sheep and 101 7611 goats (DVS, 2023). The mortalities in sheep and goats could be extensive in the event of a PPR outbreak.

The Namibian government's surveillance strategies, implemented by the DVS under the Ministry of Agriculture, Water, and Land Reform (MAWLR) aim to prevent the introduction of PPR, detect it early, and demonstrate the absence of PPR in the country through periodic serological surveys. These measures demonstrate Namibia's commitment to having the entire country recognized as PPR free, not just the current zonal status.

According to the PPR Global Eradication Program, Namibia is at stages 3 to 4 in the PPR risk management framework. Namibia's strategic surveillance will help accelerate the goal of having the NCAs officially recognized as PPR-free.

Currently, Namibia's PPR-free status is only zonal and not the entire country (Figure 1 and Figure 2).

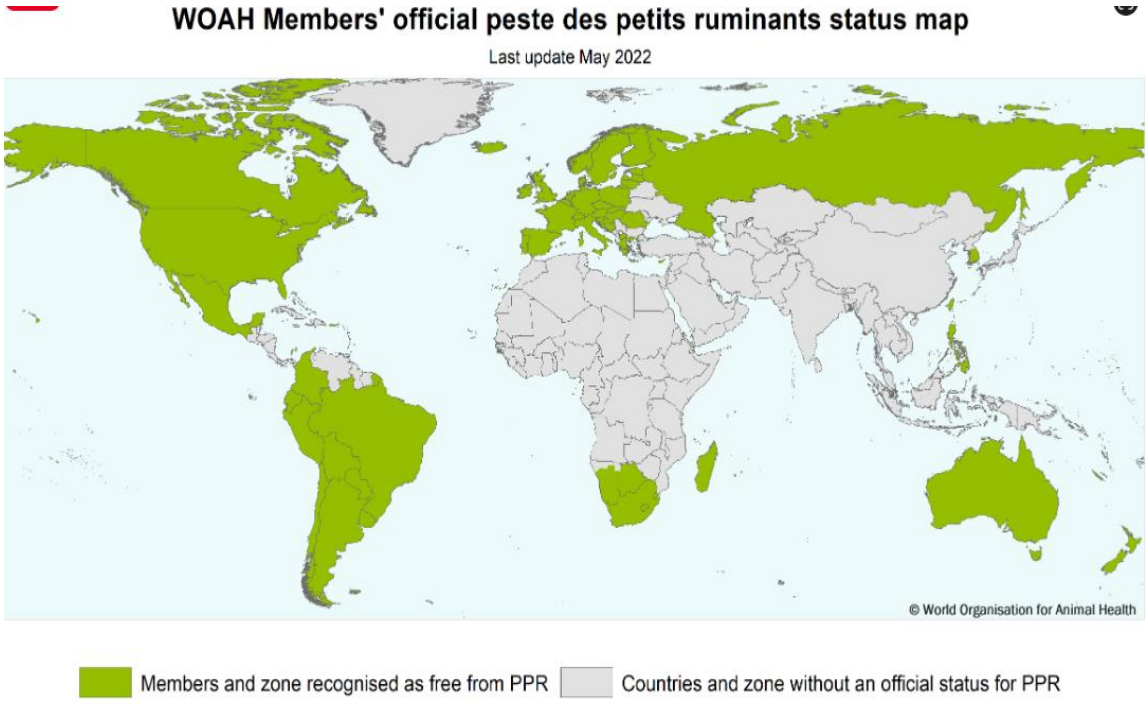


Figure 1: PPR worldwide map as of May 2022 indicating countries and zones that are recognized as free (Green) and countries and zones that have no official status for PPR (Source: WOAH, 2023)

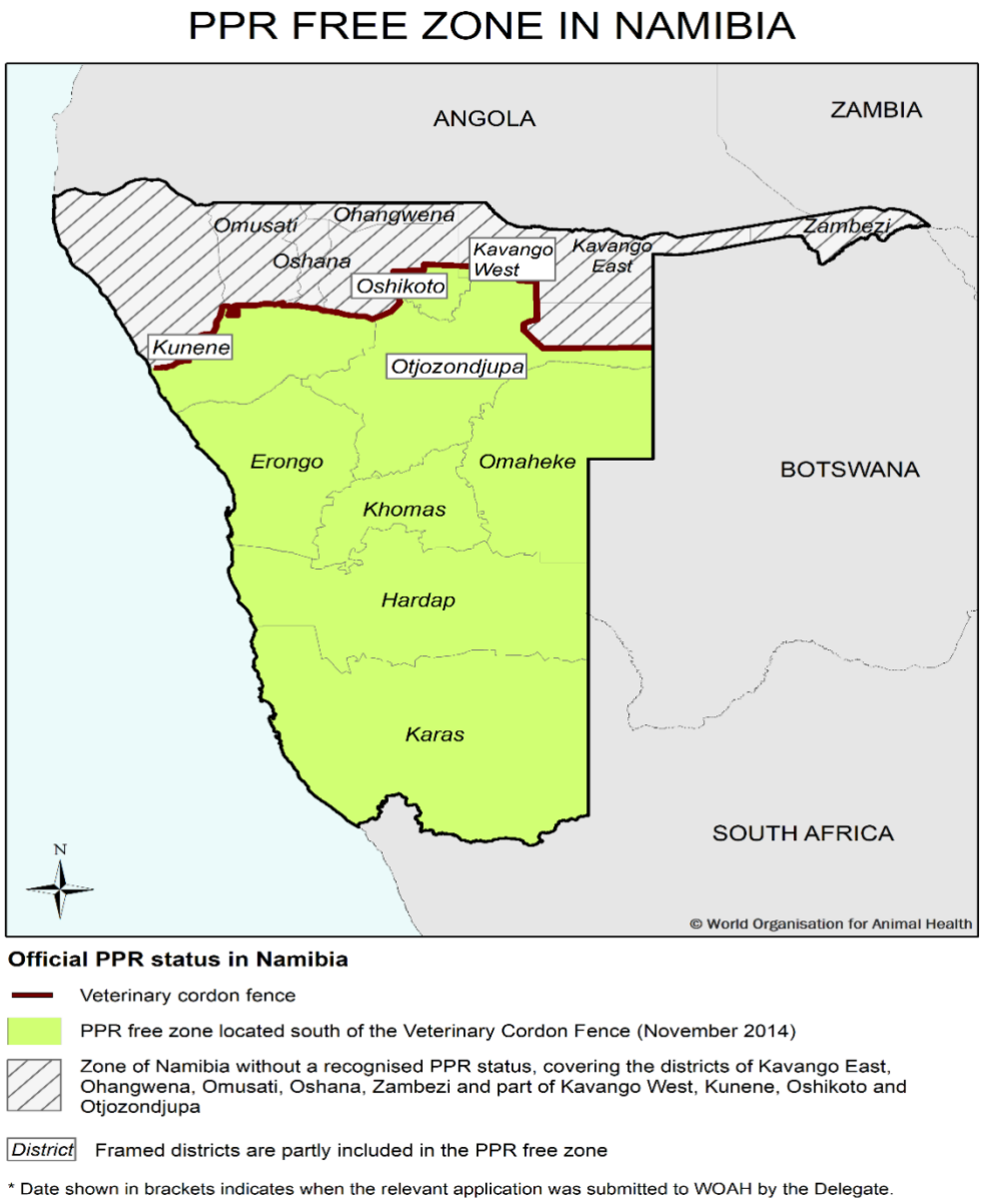


Figure 2 PPR status map in Namibia indicating the official free zone and the zone without official free status as of 2014 (Source WOAH,2023)

If PPR incursion were to occur in Namibia, Angola would be the potential source of the virus. The most closest outbreak of PPR was reported in Cabinda province in Angola in 2012 (FAO, 2016). The movement of people and livestock across the borders of Namibia and Angola poses a potential risk of introducing disease into Namibia. The border between southern Angola and northern Namibia is considered “porous”, because of the absence of fences in some sections thus allowing farmers and livestock to move between the

countries at undesignated and unmanned points, especially in the regions being studied (Katunahange B K, 2016). Generally, borders in many African countries are similarly described (Britton et al., 2019). The reason for this movement is that local farmers believe there are better pastures for livestock in southern Angola, but better water infrastructures in northern Namibia. Consequently, Namibian farmers prefer to herd their livestock in both countries. Additionally, some NCA farmers have historically lived in both countries and may occasionally want to visit either country to see their relatives and for other reasons (Personal Communication). If the movement patterns continue, small stock in Namibia will be at risk of exposure to PPR.

The DVS performs regular serological surveys to monitor the prevalence of PPR and assess the associated risks. In 2014, 338 serum samples and in 2019, 400 samples were tested, with negative results. One thousand six hundred samples will be tested in 2023, with the target areas being communities along the border and the open market areas (Global Framework, 2021).

The risk associated with the movement of people and livestock across the Namibia/Angola border needs further analysis. The present study focuses on small stock farmers as the primary drivers for the movement of livestock across the borders. The study used a knowledge, attitudes, and practices (KAP) survey in the Namibian communities bordering Angola to identify risks and to gain insight into perceptions of the farmers towards PPR. The findings of this study will add to the knowledge base on PPR surveillance and will support the DVS in its efforts to have the NCAs officially recognized as PPR-free.

1.2 Objectives

The study aimed to achieve the following objectives:

1. Assess the extent of knowledge among small stock farmers residing along the Namibia/Angola border regarding PPR.
2. Evaluate the attitude of small stock farmers residing along the Namibia/Angola border towards PPR.

3. Evaluate the farming practices of small stock farmers residing along the Namibia/Angola border.
4. Use the Knowledge, Attitudes and Practices (KAP) analysis to determine the risk of the introduction of PPR in the NCA of Namibia.
5. Develop recommendations to improve PPR prevention measures in Namibia.

CHAPTER 2

2. Literature Review

2.1 Case Definition

Peste des petits ruminants (PPR) is an economically important disease of small stock which is caused by a virus known as *Morbillivirus caprinae* belonging to the genus *Morbillivirus*, *Paramyxoviridae* family. The infectious agent is spread by direct contact between the sick and healthy animals. It also affects wild small ruminants and other artiodactyl species. The clinical signs present acutely or in a subacute manner. The virus causes elevated temperature and inflammation in the intestines, stomach, lungs, and buccal cavity, resulting in foetid diarrhoea, pneumonia, halitosis and ultimately mortality (Chazya et al., 2015; WOAH, 2018).

2.2 Aetiology

Morbillivirus caprinae was previously known as *peste des petits ruminants* virus (PPRV) (ICTV, 2023). There are several synonyms for PPR including "goat plague", "pseudo-rinderpest", and "stomatitis-pneumo-enteritis syndrome" (Kock, 2022). The viral genome comprises one non-segmented strand. There is only one serotype but four lineages (Charbonnier & Laveissière, 2015; Chazya et al., 2015; WOAH, 2018). The virus is like the rinderpest virus of large ruminants (cattle and buffaloes) (Charbonnier & Laveissière, 2015). Other morbilliviruses are closely related to it, for example, the measles virus in humans, distemper virus of dogs and some of the wild carnivores and the morbilliviruses of aquatic mammals (Charbonnier & Laveissière, 2015).

2.3 Epidemiology

Peste des petits ruminants (PPR) is an one of the World Organization for Animal Health (WOAH) listed diseases (Britton et al., 2019). It originated from Cote de Ivoire (Ivory Coast) in 1942 and has since spread to many parts of the world. From Côte d'Ivoire, the disease spread to countries in West Africa, before

spreading to Sudan and Tanzania, then escaping into countries in Asia, returning and widening its net across some more African countries, then the Near and Middle East, and spreading to some localities in Europe.

Goats and sheep are commonly affected (Al-Dubaib, 2009) and susceptibility is lower in adult animals compared to juvenile ones (Moudgil et al., 2022; Rashid et al., 2008). When species are compared, severity is higher in goats than in sheep. Naïve animals tend to experience higher morbidity and mortality than vaccinated animals (Moudgil et al., 2022). *Morbillivirus caprinae* also affects a range of wild herbivores (WOAH, 2018). Transmission usually occurs between domesticated small ruminants but other domestic animals like cattle and pigs do not transmit the virus to other animals; their clinical signs are mildly expressed. The same is observed for buffaloes. Camels can also be affected by this virus (WOAH, 2018). Goats and sheep are therefore particularly important for the transmission of the disease.

The virus is easily spread by direct contact (Legnardi et al., 2022) and is shed by both the sick animals and the animals incubating the virus. The spread of the disease among animals occurs primarily through inhalation and ingestion. The virus is not vector borne. The presence of the virus in various secretions and excretions, such as tears, nasal discharges, coughed secretions, and faeces, enhances transmission through direct contact with infected animals or fomites. In addition, any material that the sick animals have been in contact with has the potential to be a source of the virus. This could be common water sources, animal feed, grazing areas and any other materials. Sick animals and susceptible ones come in close contact with each other during animal auctions or sales, or when they are moved from one locality to another including across national borders, increasing the chance of spread of PPR. Many stressors for animals can trigger the disease in the susceptible species. Exposing animals to heat or cold, crowding them in smaller spaces, moving them from one place to another, and putting dissimilar groups together are some of the stressors known to increase the chance of infection (Chazya et al., 2015; Parida et al., 2015).

2.4 Clinical Signs

Compared to sheep, goats experience more serious clinical signs of PPR (Jones et al., 2020). The morbidity rate is 90 – 100 per cent in affected animals whilst about half of them can potentially die from PPR but the mortality rate can reach 100 per cent in naïve animals (WOAH, 2018). Fever, enlargement of lymph nodes, protruded tongue with running saliva and halitosis are observed. The fever can result in animals aborting if pregnant. In addition, affected sheep and goats have foul smiling diarrhoea that stains the hindquarters. The diarrhoea can result in severe dehydration. Since PPR is accompanied by anorexia, and diarrhoea it also results in emaciation. The virus also causes pneumonia with watery nasal discharges that become mucopurulent in the later stages. Pneumonia causes animals to be anoxic and weak. The virus also suppresses the immune system resulting in secondary concurrent infections with infectious agents such as *Escherichia coli*, *Pasteurella multocida* and *Eimeria* species thus accentuating the clinical signs. Recovered animals have lifelong immunity (Jones et al., 2020; Kock, 2022).

2.5 Pathology

The affected animals exhibit a range of pathological lesions, including congestion, atelectasis, and consolidation in the lungs due to interstitial pneumonia. Lesions in the gastrointestinal tract include erosive and necrotic stomatitis affecting the lips, dental pads, and gums. Crusty scabs are also prevalent along the outer lips of affected animals. The small intestines are congested with some haemorrhages in the longitudinal mucosal folds. The large intestine presents with zebra striping due to severe congestion. The spleen and lymph nodes may be enlarged. Upon histopathological examination, intracytoplasmic and intranuclear inclusion bodies and syncytial cell formation can be observed in the mucosa of the intestines and lungs as well as in the lymph nodes (Chazya et al., 2015; Kabir et al., 2019; WOAH, 2018).

2.6 Diagnosis

There are several closely related conditions that should be ruled out to reach a definitive diagnosis. Pasteurellosis respiratory signs are like PPR and need to be ruled out. Orf (sore mouth) can resemble the lesions caused by erosive stomatitis. Contagious caprine pleuropneumonia (CCPP) has morbidity and mortality patterns like PPR. Bluetongue and Nairobi sheep disease can cause economic losses just like PPR and should be ruled out. The gastrointestinal lesions of enteric colibacillosis and the diarrhoea of coccidiosis need to be differentiated from PPR. In addition, these conditions cause mortalities in sheep and goats. Poisoning by some minerals also causes mortalities and needs to be ruled out (Balamurugan et al., 2014; Saliki, 2014; WOAH, 2018).

Tentatively, a diagnosis is based on classical clinical and pathological lesions, epidemiological history and clinical pathology (haemoconcentration, reduced white blood cell counts, hypoglycaemia, reduced sodium, reduced potassium, and uraemia). A confirmatory diagnosis is based on viral agent identification (Balamurugan et al., 2014; Saliki, 2014).

Viral identification is key for a definitive diagnosis and several techniques can be employed. Immunohistochemistry uses antibodies to detect specific proteins. The serological approaches using dot-ELISA and agar gel immunodiffusion (AGID) are also used to reach a confirmatory diagnosis. In terms of molecular biology, the reverse transcription PCR (RT-PCR) and a simplified SYBR green real-time RT-PCR assays can be used. A combination of serology and molecular biology can be achieved using counter-immuno-electrophoresis (CIEP) to reach the confirmatory diagnosis (Balamurugan et al., 2014; Saliki, 2014).

The compliment fixation test (CFT), virus neutralisation test (VNT) and the competitive-enzyme linked immune-sorbent assay (cELISA) are some of the tests used to detect specific PPRV antibodies (Balamurugan et al., 2014; Saliki, 2014; WOAH, 2018). However, it should be noted that serological

diagnosis can only be done on the demonstration of seroconversion on acute and convalescent serum samples.

2.7 Prevention and Control

Treatment is symptomatic and supportive. Although hyperimmune serum in its early stages is effective by itself (Ihemelandu et al., 1985) or in combination with antibiotics (Yousuf et al., 2015), it is potentially reserved for a few valuable stud breeds rather than for routine use as its use is not practical and therefore not used for commercial herds. Because PPR causes dehydration, restoring fluids is essential. Antibiotics can be used for secondary infections. The inflammatory conditions and pain can be addressed using non-steroidal anti-inflammatory drugs.

The cornerstone of control is the prevention of contact between infected and susceptible animals. It is good practice to keep new animals, or the sick ones quarantined or isolated from the rest, noting that PPR is contagious. In some cases, it may be necessary to euthanize the sick or the exposed ones. Since PPR is highly contagious, cleaning and disinfection of the equipment and premises (where feasible) can be carried out. Movement controls particularly across borders are important elements to consider. Where PPR is known to occur, vaccination of goats and sheep at six months of age is recommended. The booster can be given annually (Singh & Bandyopadhyay, 2015).

Peste des petits ruminants (PPR) vaccines consist of live attenuated vaccines, which present certain challenges in terms of maintenance due to the need for a cold chain. Furthermore, it can be difficult to distinguish these from field infections. However, newer vaccines have been developed, including edible vaccines, subunit vaccines, recombinant poxvirus vaccines, combined vaccines, anti-idiotypic vaccines, positive and negative marker vaccines through reverse genetic approach, virus-like particle vaccines, and chimeric vaccines. These newer vaccines are highly potent, effective and safe (Niedbalski, 2023).

In free areas, stamping out is beneficial for arresting incursions and for the quick resolution of the free status.

2.8 Socioeconomic impact

Sheep and goats provide a source of income for rural farmers and an outbreak of PPR in susceptible herds has the potential to cause quite substantial economic losses (OIE & FAO, 2015). Peste des petits ruminants (PPR) has both direct and indirect impacts. Indirect effects include food insecurity, poverty, and loss of livelihood in affected communities. Direct costs arise from disease morbidity and mortality. A study conducted in Pakistan found the costs ranged from expenses related to drugs, emaciation, decreased market value, additional human resource costs, veterinary consultations and the death of the sheep and goats (Abubakar & Munir, 2014). The experience in Uganda noted losses related to medicine costs, the death of small stock and the inability to sell the sheep and goats. The squabbles between the pastoralists were also noted (Akwongo et al., 2022). In the Democratic Republic of Congo (DRC), about 120 000 sheep and goats were lost during the period from its emergence in 2010 until June 2012. The direct losses (actual value for the sheep and goats) were around US$5.3 million. (LIMS/AIMS, 2012). Vaccination following an outbreak can also cause costs that could have been prevented if PPR had not occurred in a new area, as was the case in Burkina Faso and the Sahel (Ilboudo et al., 2022). In Pakistan, it was observed through serological tests that positive goats aborted more than the negative ones (Abubakar et al., 2008).

2.9 PPR in SADC region

Within SADC, Namibia, Botswana, South Africa, Eswatini, Mauritius and Madagascar are countries that have been declared by the OIE as PPR-free (with Namibia`s status being zonal) (WOAH, 2018). The emergence of PPR was initially documented in the Republic of Tanzania back in 2008. Since then, it has unfortunately made its way to other member states, including the Democratic Republic of Congo (DRC) and the Comoros. Angola also reported cases of PPR in 2012. Although Zambia and Mozambique have identified seropositive goats, they have not observed any clinical signs. Furthermore, countries that share a border with infected member states are at greater risk of a PPR incursion. This includes several SADC countries, such as Namibia, Zambia, Malawi, and Mozambique (Britton et al., 2019).

CHAPTER 3

3. Materials and Methods

3.1 Study Area

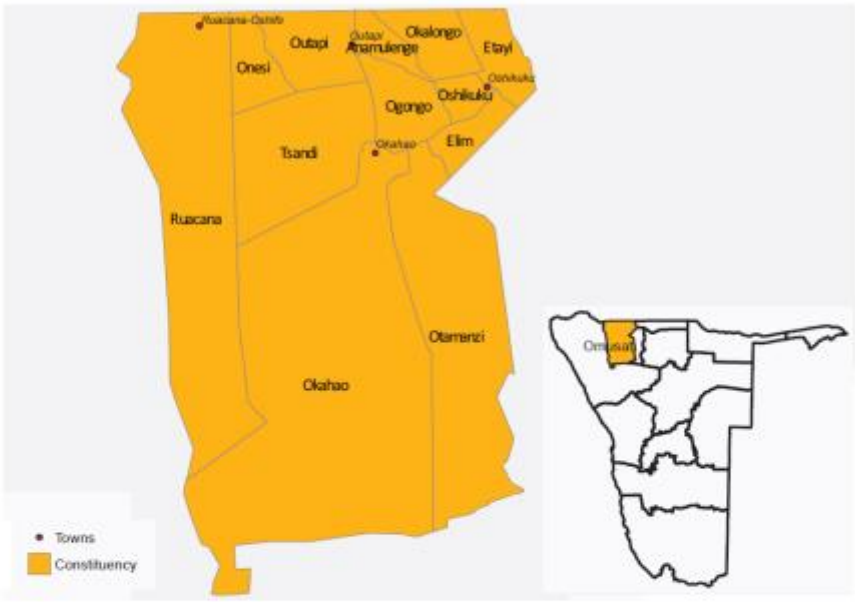
The study was conducted in two regions, Omusati and Ohangwena, in Namibia. They were purposely chosen based on their relative proximity to Angola and the extensive informal traffic of both people and animals between northern Namibia and southern Angola.

Omusati Region in Namibia lies between -18° 24' 25.306" N and 14° 50' 43.663 E. The region is comprised of twelve constituencies, namely: Tsandi, Okahao, Otamanzi, Elim, Ogongo, Ruacana, Outapi, Anamulenge, Etayi, Onesi, Okalongo and Oshikuku (Maldonado, 2023a) (Figure 3). There are about 133 621 males and 109 545 females in the Omusati region and about 22% of the inhabitants of the Omusati region rely directly on farming as their primary source of income (Mouton, 2021).

Ohangwena region in Namibia lies between -17° 35' 52.545" N and 16° 49' 4.216 E. The region is comprised of twelve constituencies, namely: Eenhana, Endola, Epembe, Engela, Ondobe, Ohangwena, Okongo, Oshikango, Ongenga, Omundaungilo, Oshikunde and Omulonga. (Maldonado, 2023b) (Figure 4).

There were about 112 130 males and 133 316 females in the Ohangwena region in 2011 (Shimuafeni, 2019) and about 26% of the inhabitants of the Ohangwena region directly rely on farming as their primary source of income (Mouton & Dirkx, 2012).

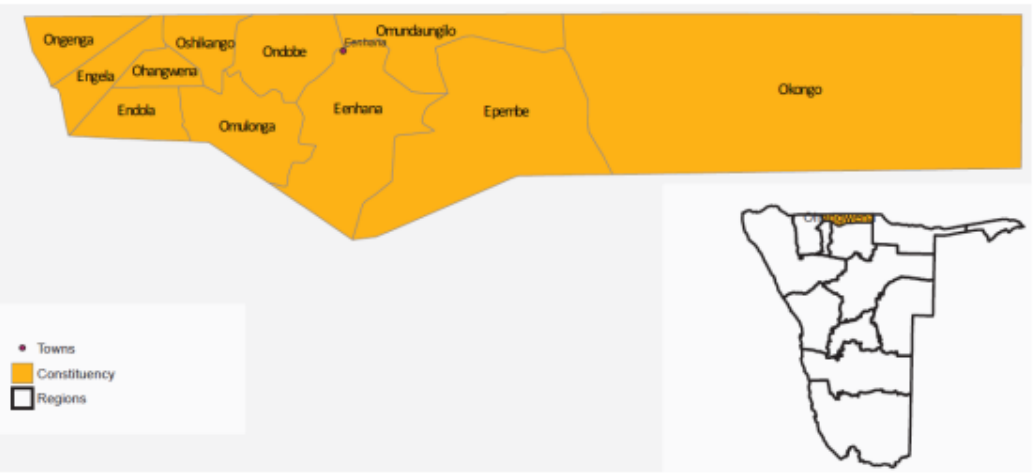
CONSTITUENCIES AND SELECTED TOWNS FOR OMUSATI REGION



Total Population	
Omusati	243 166
Anamulenge	13 410
Elim	11 406
Etayi	35 101
Ogongo	19 546
Okahao	17 548
Okalongo	30 609
Onesi	13 149
Oshikuku	9 093
Otamanzi	36 934
Outapi	14 857
Ruacana	28 018
Tsandi	13 495

Urban Localities in Omusati	
Outapi	6 437
Oshikuku	2 761
Okahao	1 665
Ruacana	2 985

Figure 3: Constituencies, the respective populations per constituency and selected towns in the Omusati region of Namibia. (Source: Omusati Regional Profile)



Total Population	
Ohangwena	245 466
Eenhana	21 089
Endola	25 591
Engela	24 271
Epembe	16 229
Ohangwena	17 468
Okongo	25 698
Omundaungilo	7 855
Ondobe	23 954
Ongenga	22 075
Oshikango	28 635
Omulonga	32 581

Urban Localities	
Eenhana	5 528

Figure 4: Constituencies, the respective population per constituency and selected towns in the Ohangwena region of Namibia. (Source: Ohangwena Regional Profile)

Six Omusati constituencies and six Ohangwena constituencies directly border the Namibia/Angola border and were selected for the study. The others further inland were excluded from the study. Thus, the selected constituencies for the study in the Omusati region were Ruacana, Onesi, Outapi, Anamulenge, Okalongo, and Etayi, while those in Ohangwena were Ongenga, Engela, Oshikango, Ondobe, Omundaungilo, and Okongo.

Only villages within 10 - 20 km from the Namibia/Angola border were randomly selected for the study based on their likelihood for farmers to move across the Namibia/Angola border (Figure 5).

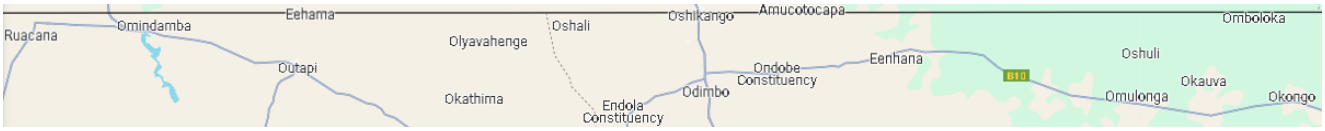


Figure 5: Map of the study area in the Omusati and Ohangwena regions of Namibia showing approximate demarcations of the target sampling areas, lying within 10 - 20km of the Namibia/Angola border. (Source: Own generated using Google Maps)

3.2 Study Design

This study utilized a qualitative descriptive survey design, which involved administering questionnaires and conducting interviews with communal farmers who resided within 10 - 20 km of the Namibia/Angola border within the Omusati and Ohangwena regions of Namibia.

3.3 Sample Size and Sampling

The number of livestock farmers was estimated from the 2019 Namibia Statistics Agency (NSA) reports, which indicated 14 354 livestock farmers in the Omusati region and 10 927 in the Ohangwena region (Shimuafeni, 2019). The total number of farmers was 25 281 for the two regions.

Equation 1: Formula used in Survey Monkey for calculating sample sizes in statistics. Source (Sample Size Calculator: Understanding Sample Sizes | SurveyMonkey)

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

N = population size • e = Margin of error (percentage in decimal form) • z = z-score

Therefore, for the present study, a web-based calculator (Survey Monkey) was used to calculate the sample size (Figure 6)

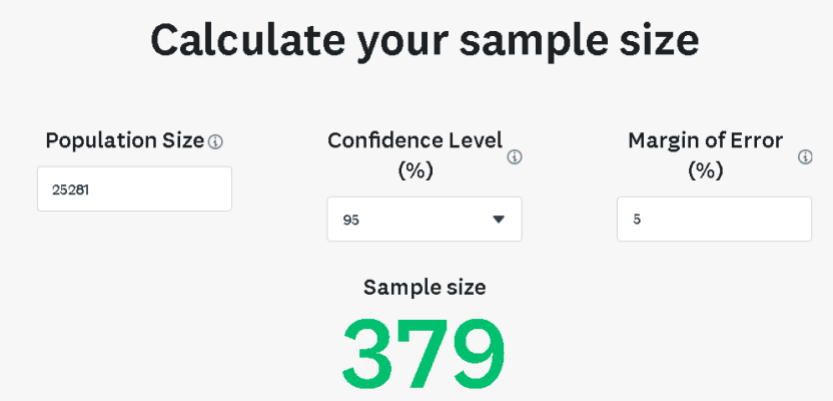


Figure 6: Sample size determination using Survey Monkey calculator.

A total of 379 questionnaires were administered to farmers in the study, with a stratified simple random sampling method employed to ensure representativeness. The twelve strata were formed by the six constituencies in both the Omusati and Ohangwena regions. Villages were then randomly selected within each stratum, with three villages per constituency chosen using a randomizer. The goal was to survey 11 farmers per village (33 samples per village), and if this number was not met, additional samples were intentionally selected through a door-to-door approach.

3.4 Data Collection

The data was mainly collected through the farmers questionnaires. Additionally, professional staff within the Directorate of Veterinary Services (DVS) were informally consulted for their opinions, especially concerning livestock movements across the Namibia/Angola border, because there was limited published information on movement patterns of livestock across the Namibia/Angola border. For confidentiality and anonymity, their opinions are cited as personal communication.

The farmers` questionnaire was developed using a web-based application from “Free Online Surveys Questionnaire”. The first step in developing the surveys was the preparation of the Farmers Questionnaire and the Consent Form in English. The questionnaire and the respective consent forms were then translated and tested on selected local Oshikwanyama-speaking natives. The forms were then submitted for ethical clearance.

The data collection began with recruiting five interpreters who were trained to administer the farmer's questionnaire. Uniformity in the interpretation of the questions by the interpreters was tested as follows: the first interpreter would ask the second interpreter in English to translate a question into the local vernacular language (Oshikwanyama). This interpreter would translate and ask the same question in vernacular to the third interpreter. The third interpreter would then relay the question asked in the vernacular to the first interpreter in English. Any misinterpretations were adjusted by consulting the approved translated document and seeking consensus among all the interpreters. Sometimes, consultation was made with an external linguistic person for assistance. Once all the potential questions were clarified, a schedule to visit the farmers was finalised.

Before the visit occurred, permission was sought through the office of the chief regional officers for the two regions (Appendix 6) who then communicated to the respective regional councillors for all the target constituencies. The regional councillors then spoke to the farmers in the target villages to assemble at their usual meeting points. The local radios and farmer's unions were used to mobilize the farmers. The principal investigator (me) and the interpreters would then visit each target village according to an agreed schedule between the regional councillors and the farmers.

At each village, the exercise began with remarks from the regional councillor who would introduce the principal investigator and the team and the general purpose of the meeting. After that, the principal investigator through one translator would narrate the purpose of the meeting in detail, explain the procedure, what the farmers are expected to do, and the contents of the consent form. Questions, comments, and clarity were allowed before the questionnaire was administered. Once the farmers were happy to participate, they were informed that they would only be filling in the questionnaires with the help of the interpreters. Once the consent form was signed, the questionnaire was administered using an interview approach. The interpreter would go through the 46 questions on each participating farmer. The principal investigator supervised the interpreters by monitoring their progression and addressing any challenges. Finally, the principal investigator would receive and review each completed questionnaire on-site as soon as they were

completed. The principal investigator would directly administer the survey where farmers were conversant in English. After all the attending farmers were interviewed, a tally of questionnaires was done to check if they met the minimum number for that constituency. If not, the principal investigator, with the permission of the regional councillors, proceeded to seek more questionnaires on a door-to-door approach in that constituency until the target sample size was reached.

The data entry was done by the principal investigator in the field. The process began with coding the questionnaire with numbers corresponding to the choices made by the respondents. Where one choice was required, the respondent`s choice was indicated accordingly as a single digit. Where two or more choices were possible, the possible choices were first given letter designations, then each chosen letter was assigned "1" whilst the none chosen ones were assigned "2". Tally was then made for all the "1" corresponding to "yes" for that option. Based on that it was revealed how many "1" for that option. The grand total was derived from all "1" for all the options. Each option was then weighed against this to derive eventual percentage selection for that choice. After this preparation, the data was then manually entered into excel sheet using codes as per Annex 7. In cases where the information was not clear, the translators asked the respondents to clarify since the data entry was being done in the field. Nonetheless, some respondents immediately left after completing the questionnaire and unverified portions of their questionnaires were not entered. Consequently, some few questions did not have all the 376 responds.

After that, the principal investigator and the interpreters' team travelled back to the duty station (UNAM Ogongo Campus). The following day would be handled similarly until all the constituencies were sampled. After each data collection, time was made for the principal investigator and the interpreters to verify the data entered in the Excel sheet.

3.4.1 Farmers Questionnaire

The farmers' questionnaire aimed to gather information on the knowledge, attitudes (behaviours) and practices of the farmers in Namibia's Omusati and Ohangwena regions on the risk of PPR introduction from

Angola into Namibia. The questionnaire had four sections, namely Biographical (Questions 1 - 9), Knowledge (Questions 10 - 18), Attitudes (Questions 19 - 30), and Practices (Questions 31 - 46). The biographical section gathered information on the demographic data of the farmers; the knowledge section analysed what the farmers already know about PPR and general disease prevention strategies in small stock; the attitude section gathered information on what the farmers feel about PPR; the practices section analysed activities that farmers are currently doing which may increase or lower the risk of introduction of PPR into Namibia. Only farmers with small stock in the study area were selected for the one-on-one interviews. The interviews were conducted in the local language with the help of native citizens (interpreters) for the translation. The gathered information was captured in a spreadsheet. No sessions were recorded.

3.5 Data Analysis/Statistical Analysis

The collected data were first coded, then captured into Microsoft Excel® Version 2310 (build 16924.20124), cleaned for errors and then analysed primarily using Microsoft Excel as above, with cross-referencing from the Jamovi statistical software package version 2.4.8.

To begin the analysis on Excel, we first ensured that the data was clean by checking for any obvious errors. For example, we looked at the number designations as per the coding of the farmers' questionnaire (see Annex 7) and made sure that each question or subpart had a single-digit number. If any double-digit numbers or numbers that exceeded the available choices were found, we verified them from the questionnaires and corrected them accordingly. We also checked for any letters or other characters in the cells.

Once the data was cleaned up, it appeared on the Excel dataset as a spreadsheet with questions (or sub questions) on columns and each individual farmer's answers as rows tallied to each question or sub question. We then used the pivot function, which can be accessed via the insert tab, to do the analysis. The respective pivot table fields were selected, and the corresponding questions were dragged into appropriate fields for

analysis. The values were adjusted as needed using the value field settings, such as changing from "sum" to "count."

Next, the recommended charts from the insert tab were used to generate bar graphs. The graphs were edited as needed and further refined using the properties inherent in bar graphs, such as chart elements to add axis titles and chart styles to adjust colour and so on. The insert table function was also used to create tables, which were then edited using table properties from the "table design" and the "home" ribbons.

CHAPTER 4

4. Results/Observations

4.1 Section A: Demographic Information of the Respondents

Data were collected from twelve constituencies located in the Omusati and Ohangwena regions with a response rate of 99%. Fifty-one per cent were from the Ohangwena region, while 49% were from the Omusati region, resulting in a balanced representation of both constituencies. The constituencies of Onesi, Outapi, and Oshikango had the highest number of respondents (Figure 7).

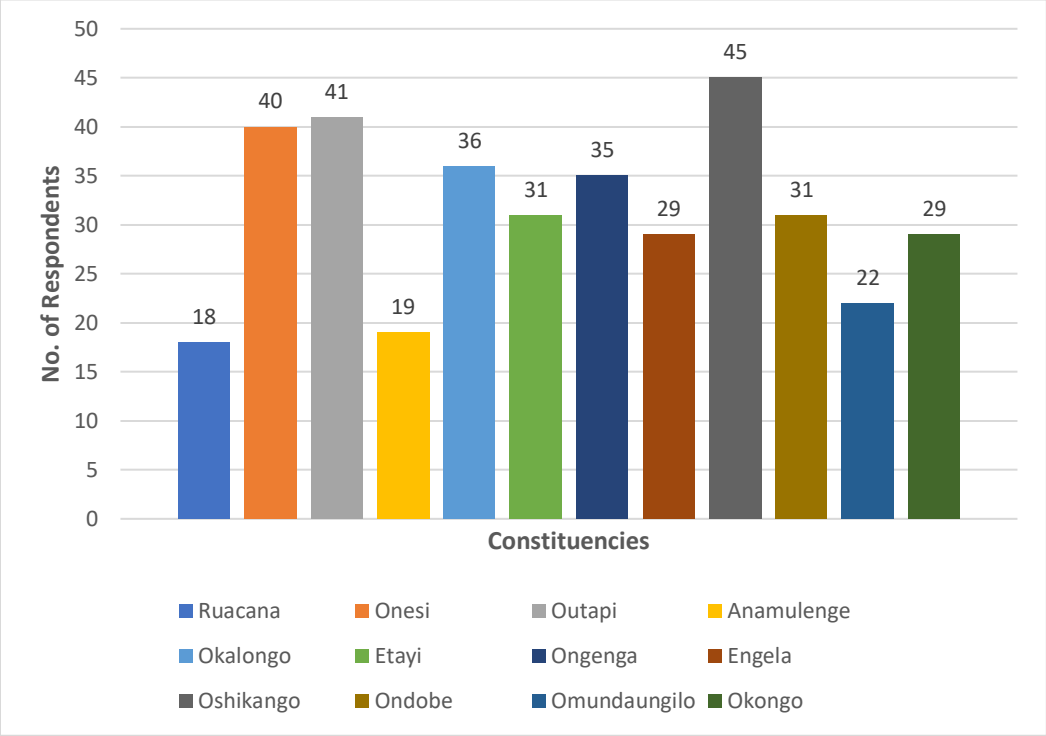


Figure 7: Number of surveyed respondents in each of the sampled constituencies of the Omusati and Ohangwena regions of Namibia during the KAP analysis of PPR risk of introduction in the NCAs of Namibia

Most respondents were male (61.7%) while 38.3% were female.

Forty-three per cent of the respondents were between 45 and 74 years old. Forty-four per cent had completed secondary education as their highest qualification. For an overview of the respondent's demographics, please refer to Table 1, which summarizes the data by gender, age, and education level (Table 1).

Table 1: Respondents in the Omusati and Ohangwena regions of Namibia categorized according to their gender, age, and highest education level.

Criteria	Categories	Male	Female	Total	%
Age	18-24 years	17	7	24	6
	25-34 years	32	14	46	12
	35-44 years	40	22	62	16
	45-54 years	41	38	79	21
	55-64 years	46	40	86	23
	65-74 years	46	17	63	17
	75+ years	10	6	16	4
	Total	**232**	**144**	**376**	**100**
Highest Education	Did not attend school	28	15	43	11
	Primary school	57	27	84	22
	Secondary school	93	72	165	44
	High school	22	10	32	9
	Diploma	14	9	23	6
	Degree	13	8	21	6
	Others	5	3	8	2
	Total	**232**	**144**	**376**	**100**

Most farmers were engaged in full-time subsistence farming in communal areas, with 71% exclusively devoted to this occupation. Of those surveyed, 93% farmed in communal areas as subsistence farmers, and 79% raised goats exclusively (Table 2). Seventy-one per cent of the respondents also farmed cattle (Table 2).

Table 2: Respondents in the Omusati and Ohangwena regions of Namibia categorized according to the farming system and livestock ownership.

Criteria	Role/Capacity	No. of respondents	%
Capacity/Role	**Full-time farmer**	267	71
	Part-time farmer	54	14
	Livestock Keeper	47	13
	Authorized person	6	2
	Others	1	0
	Total	**375**	**100**
Farming system	**Communal**	349	93
	Commercial	17	5
	Emerging commercial	3	1
	Agro-pastoral	5	1
	Others	2	1
	Total	376	100
Small stock ownership	**None**	9	2
	Goats only	298	79
	Sheep only	2	1
	Goats and Sheep	66	18
	Total	**375**	**100**
Cattle ownership	**Yes**	266	71
	No	107	29
	Total	**373**	**100**

4.2 Section B: Knowledge Analysis of the Respondents

Eighty per cent of the respondents obtained information on important livestock diseases from the state veterinarian, agricultural extension offices and other sources (including the radio) (Figure 8).

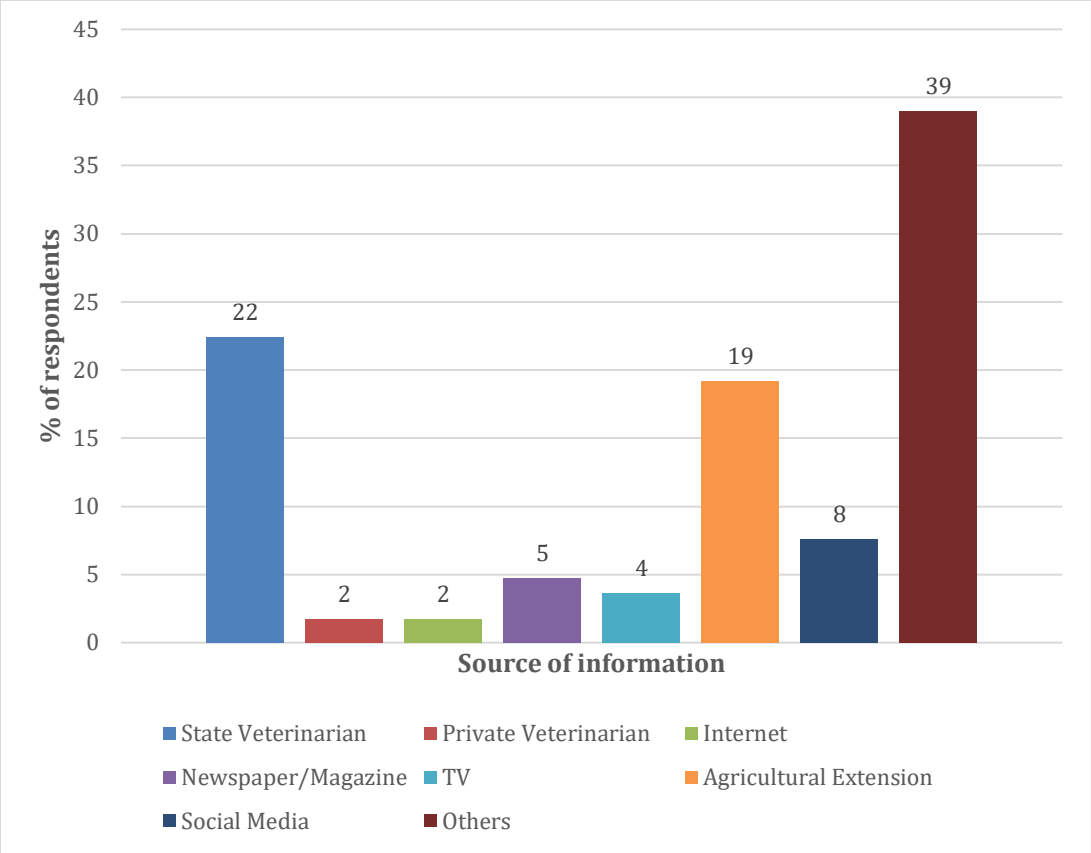


Figure 8: Percentage of respondents in the Omusati and Ohangwena regions of Namibia grouped according to what they said was the sources of information about important small stock diseases.

Fifty-nine per cent of the respondents indicated that sick sheep and goats could be identified through weakness, depression, bodily discharges, and diarrhoea (Figure 9).

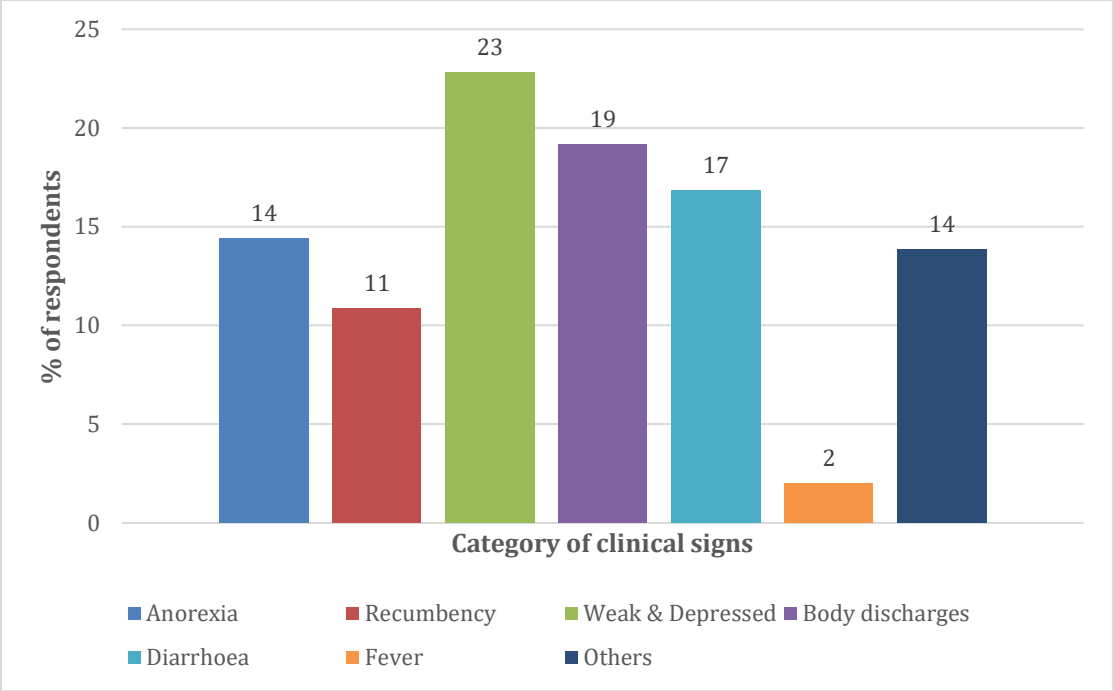


Figure 9: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped according to the type of clinical signs of small stock diseases they are aware of.

Eighty-four per cent of the respondents know that the movement of small stock can potentially spread diseases from one place to another. Seventy-two per cent of the respondents know why newly purchased small stock is quarantined before mixing with the rest of the herd (Table 3).

Table 3: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on the knowledge of general ways of how diseases in sheep and goats are transmitted and ways in which the diseases can be prevented.

Criteria	Categories	No. of respondents	%
Small stock movements can transmit diseases.	**Yes**	313	84
	No	20	5
	Not sure	28	8
	Do not know	12	3
	Total	**373**	**100**
Reason for quarantine: newly purchased small stock	**Verify incubation**	269	72
	Not necessary	42	11
	Do not know	53	14
	Others	12	3
	Total	**376**	**100**

Eighty-four per cent of the respondents had not heard about PPR (Figure 10).

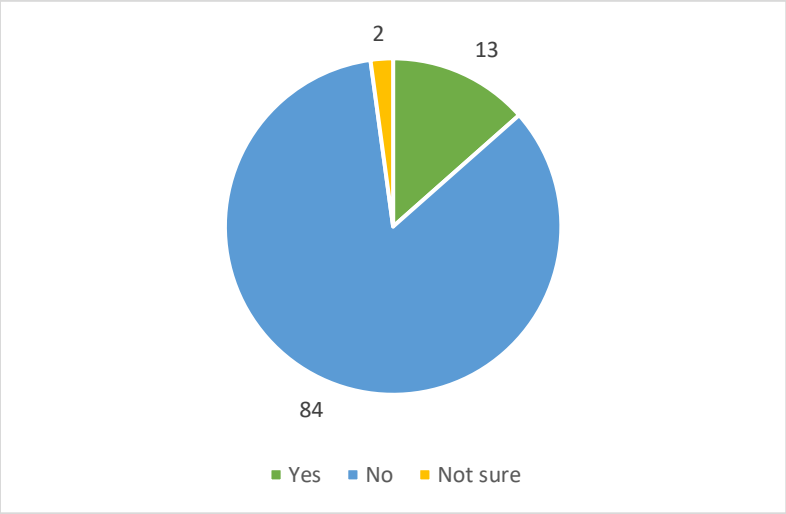


Figure 10: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on whether they have heard about PPR or not.

The respondents disagreed on whether they thought PPR was present in Namibia (Figure 11).

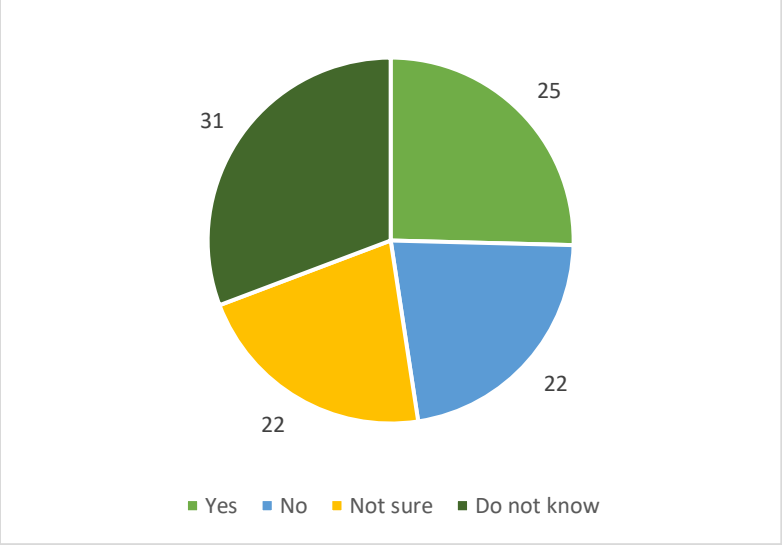


Figure 11: Percent of respondents in the Omusati and Ohangwena regions of Namibia grouped according to whether they believed PPR is currently present in Namibia or not.

Eighty-nine per cent responded that they did not know what the clinical signs of PPR were (Figure 12).

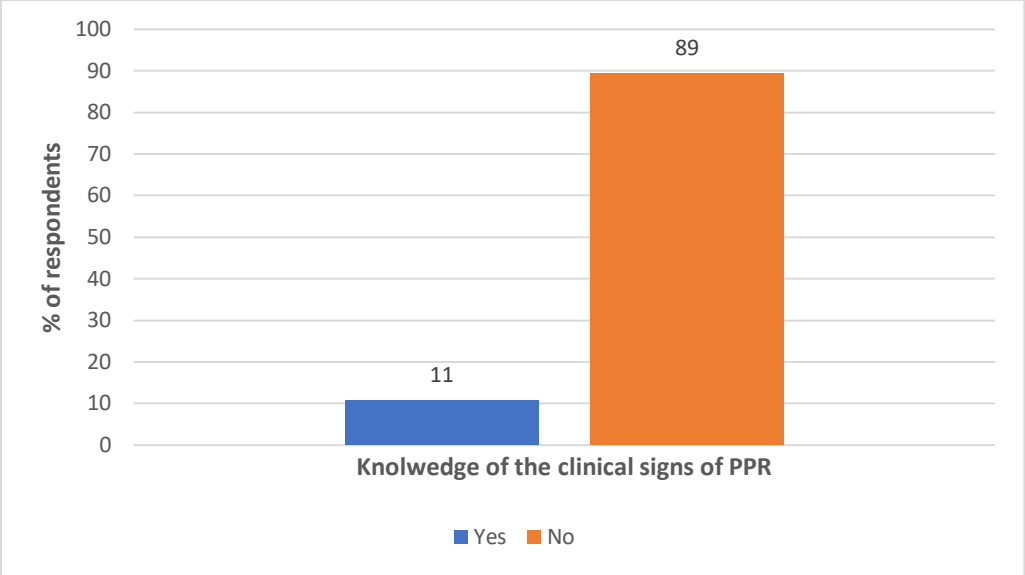


Figure 12: Percent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on their knowledge of clinical signs of PPR.

Sixty-one indicated that the potential problems caused by the PPR outbreak would be mortality and the inability to sell small stock (Table 4). Twenty-eight per cent of the respondents indicated that PPR awareness was needed to prevent its incursion in Namibia (Table 4).

Table 4: Respondents in the Omusati and Ohangwena regions of Namibia were categorized on what they think are the potential problems of a PPR outbreak and what actions they could take to prevent a PPR outbreak in Namibia.

Criteria	Categories	%
Problems caused by an outbreak of PPR	Not able to sell	21
	Mortality	40
	Costs of control	13
	No animal products	16
	Not sure	3
	Do not know	4
	Others	3
	Total	**100**
Strategies used to prevent PPR outbreak in Namibia	Use movement permits	10
	PPR Awareness	28
	Quarantine new animals	8
	Isolate sick animals	9
	Treat as vet guided	12
	No mix with strange animals	10
	Controls at border points	12
	Others	12
	Total	**100**

4.3 Section C: Respondents' Attitudes Assessments

Fifty-nine per cent of the respondents indicated that farming with small stock gives them animal products like milk and meat and disposable income. Twenty-six per cent farm with small stock as part of the expected cultural norms, particularly among the male counterparts (Figure 13).

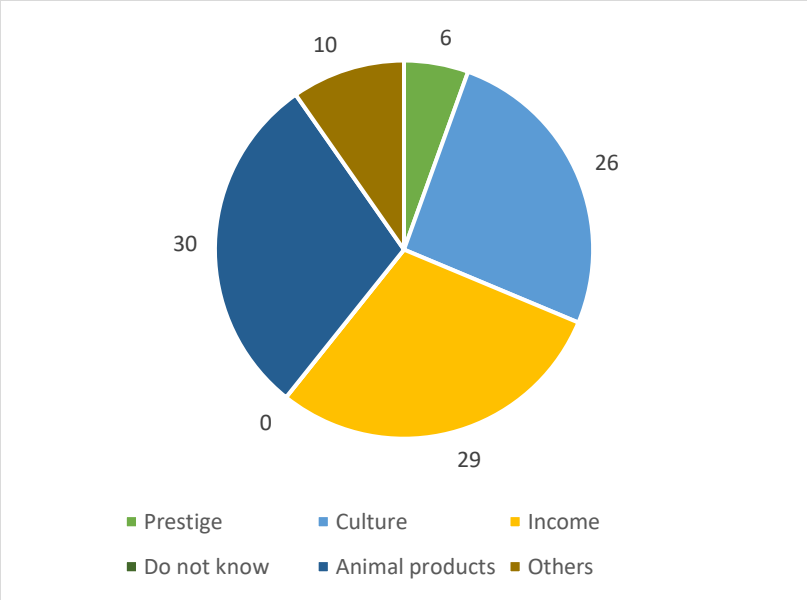


Figure 13: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on their reasons for farming with small stock.

Eighty-four per cent of the respondents have the opinion that diseases in another country should be Namibia's concern, too, as shown in Table 5 below:

Table 5: Respondents in the Omusati and Ohangwena regions of Namibia were categorized based on whether they should be concerned about disease events in other countries or not.

Concern over diseases in other countries	No. of respondents	%
Yes	314	84
No	42	11
Not sure	17	5
Total	**373**	**100**

Ninety-six per cent of the respondents believed that the movement of sheep and goats between Namibia and Angola can increase the chances of transmission of small stock diseases (Table 6). However, only 52% strongly agree that livestock movement should be strictly controlled across the Namibia/Angola border (Table 6). Inland, 94% believed that obtaining a movement permit was crucial before moving small stock from one point to another (Table 6). In addition, 71% believed that the movement of sheep and goats from one place to another in the NCAs should be controlled. (Table 6).

Table 6: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on their opinion about regulating the movement of small stock through permits, strict controls of movement at border points and control of movements within the regions.

Criteria	Categories	No. of respondents	%
Transmission of diseases due to increased small stock movement at the Namibia/Angola border	**Yes**	359	96
	No	9	2
	Not sure	7	2
	Total	**375**	**100**
Strick control of livestock movement at the Namibia/Angola border	**Strongly disagree**	80	21
	Disagree	18	5
	Neither agree nor disagree	47	13
	Agree	34	9
	Strongly agree	195	52
	Total	**374**	**100**
Control of the movement of sheep and goats in the NCAs	**Yes**	265	71
	No	80	21
	Not sure	23	6
	Do not know	6	2
	Total	**374**	**100**
Need for movement permit before moving sheep and goats	**Yes**	352	94
	No	13	3
	Not sure	7	2
	Do not know	1	0
	Total	**373**	**100**

Seventy-nine per cent of respondents strongly agreed that it was essential to routinely collect blood samples from sheep and goats to screen for diseases such as PPR (Table 7). Eighty-five per cent of the respondents believed that having facilities to isolate newly received sheep and goats was essential (Table 7). Also, 94% thought having a sick bay or a separate place to keep the sick animals was necessary (Table 7).

Table 7: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on their opinions about the use of isolation facilities, sick bays and the need for routine serosurveys in small stock.

Criteria	Categories	No. of respondents	%
Need for isolation facilities for new small stock	Yes	319	85
	No	33	9
	Not sure	16	4
	Do not know	6	2
	Total	**374**	**100**
Need for sick bay for sick animals	Yes	350	94
	No	18	5
	Not sure	4	1
	Do not know	2	1
	Total	**374**	**100**
Need for blood screening of small stock for diseases	Strongly disagree	20	5
	Disagree	12	3
	Neither agree nor disagree	20	5
	Agree	26	7
	Strongly agree	292	79
	Total	**370**	**100**

Forty-two per cent of the respondents believe that farmers should pay for veterinary services. Almost half of the respondents (49%) believed farmers should not pay for veterinary services (Figure 14).

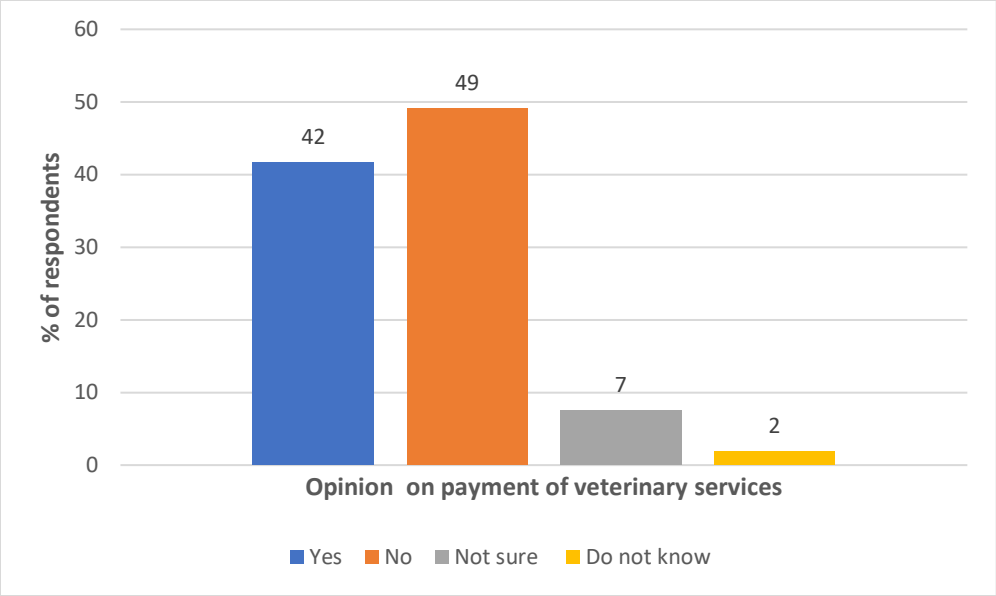


Figure 14: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped on their opinions of whether they believe farmers should pay for veterinary services or not.

Ninety-nine per cent of the farmers had the opinion that it was vital to vaccinate sheep and goats to prevent them from getting diseases, as shown in Table 8 below:

Table 8: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on their beliefs on whether it is important to vaccinate small stock or not.

Important to vaccinate?	No. of respondents	%
Yes	373	99
No	2	1
Total	**375**	**100**

Eighty-seven per cent of the respondents think it was essential to conduct a post-mortem on sheep and goats that have died of an unknown cause, as seen in Table 9 below.

Table 9: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on whether they believe postmortem should be conducted or not on sheep and goats dying of unknown causes.

Need for post-mortem	No. of respondents	%
Yes	323	87
No	33	9
Not sure	9	2
Do not know	8	2
Total	**373**	**100**

4.4 Section D: Respondents' Practices Assessments

Seventy-seven per cent of the respondents graze their livestock within the regions, while only 21% indicated that they graze in Angola (Figure 15).

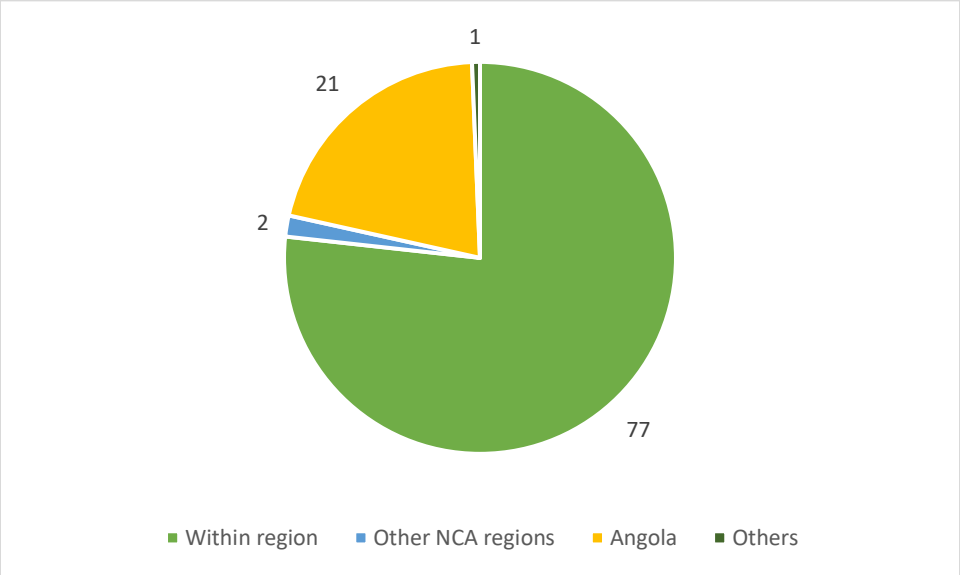


Figure 15: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on the areas where they graze their livestock.

Sixty-five per cent of the respondents can always see or examine their sheep and goats. Sixty-five per cent of the respondents responded that veterinary services are reachable if they need assistance with sheep and goats' conditions. However, only 29% have protective clothing should they intend to examine the sheep and goats (Table 10).

Table 10: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on the frequency of examination of small stock, accessibility to veterinary services and whether they have protective clothing to examine sheep and goats.

Criteria	Categories	No. of respondents	%
Frequency of examination of sheep and goats	Always	242	65
	Usually	29	8
	Sometimes	83	22
	Rarely	14	4
	Never	6	2
	Total	**374**	**100**
Availability of the veterinarian	Yes	241	65
	No, not available	63	17
	No, poor network	8	2
	No, bad roads	11	3
	No, no suitable transport	26	7
	Others	24	6
	Total	**373**	**100**
Availability of protective clothing	Yes	109	29
	No	264	71
	Total	**373**	**100**

Fifty-five per cent of the respondents' actions, when sheep and goats are sick, are to either use traditional medicines or seek advice from the pharmacist in getting the right medicine. Only 19% responded that they would consult the veterinarian from the beginning (Figure 16).

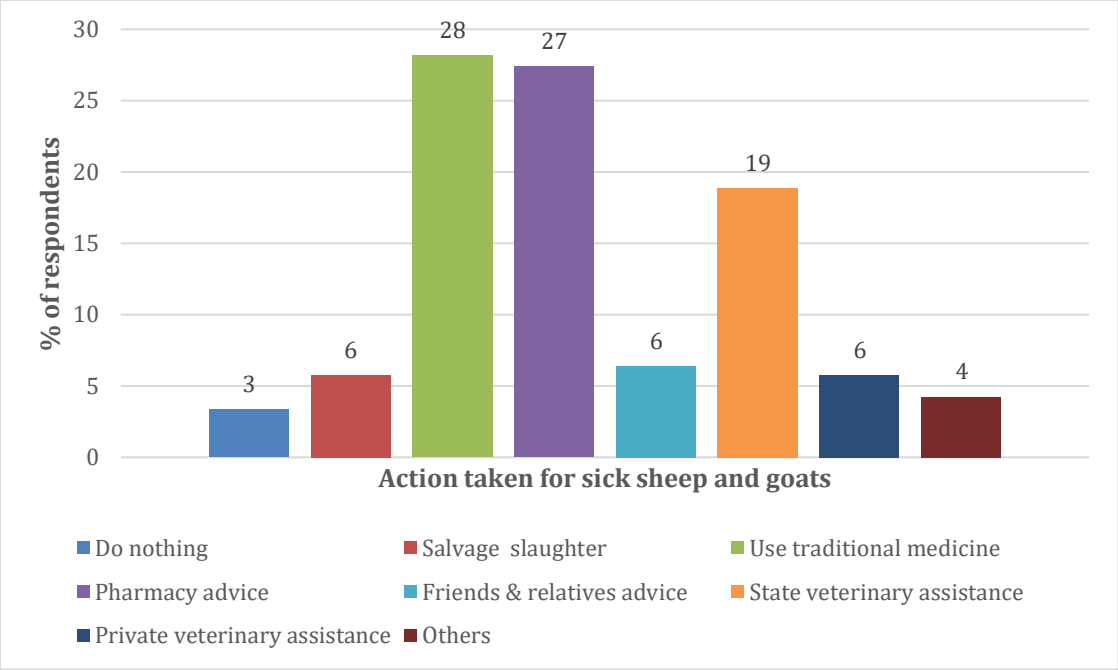


Figure 16: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on the type of actions they take when their sheep and goats are sick.

Forty-eight per cent of the respondents practised routine vaccination of sheep and goats against common small stock diseases (Table 11). Twenty-one per cent practised tick control activities (Table 11). The majority (53%) do not isolate newly purchased sheep and goats before mixing them with the rest (Table 11). Only 13% say they isolate them for 14 days before mixing them with the rest (Table 11).

Table 11: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on the type of actions they take to prevent transmission of small stock diseases.

Criteria	Categories	No. of respondents	%
Routine actions to prevent sickness in sheep and goats	**Vaccination**	300	48
	Deworming	48	8
	Tick Control	133	21
	Prophylactic antibiotics	28	4
	Proper feeding and supplementation	63	10
	Others	58	9
	Total	**630**	**100**
Isolation of newly acquired sheep and goats	**No**	196	53
	Yes 14 days	49	13
	Yes 21 days	19	5
	Yes 30 days	23	6
	Sometimes	15	4
	No, I do not know if it needed	7	2
	No, I do not believe it needed	3	1
	No no infrastructure	13	3
	Others	48	13
	Total	373	100

The respondents indicated that they purchased sheep and goats predominantly within their region (51%), with 17% purchasing from other regions. Only 20% indicated that they purchased sheep and goats from Angola. (Table 12). Many of the respondents rarely sell off their sheep and goats. Eighty-seven per cent indicated that they either never, rarely, or sometimes sell sheep and goats and when they do, they sell primarily in the region (66%) (Table 12).

Table 12: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on their purchase and selling patterns of sheep and goats, including the areas sourced and frequency of purchase and selling

Criteria	Categories	No. of respondents	%
Areas where sheep and goats are purchased from	Within region	278	51
	Other regions	94	17
	South of VCF	27	5
	Angola	111	20
	South Africa	2	0
	Others	32	6
	Total	**544**	**100**
Frequency of selling sheep and goats	Always	17	5
	Usually	26	7
	Sometimes	142	38
	Rarely	78	21
	Never	111	30
	Total	**374**	**100**
Areas where sheep and goats are sold	Within region	271	66
	In other NCA regions	27	7
	South of VCF (Quarantined)	2	0
	Angola	20	5
	South Africa	0	0
	Others	90	22
	Total	**410**	**100**

Though many respondents (43%) indicated that they do not visit Angola, the disaggregated data shows that 57% still visit Angola at varied frequency levels (Figure 17).

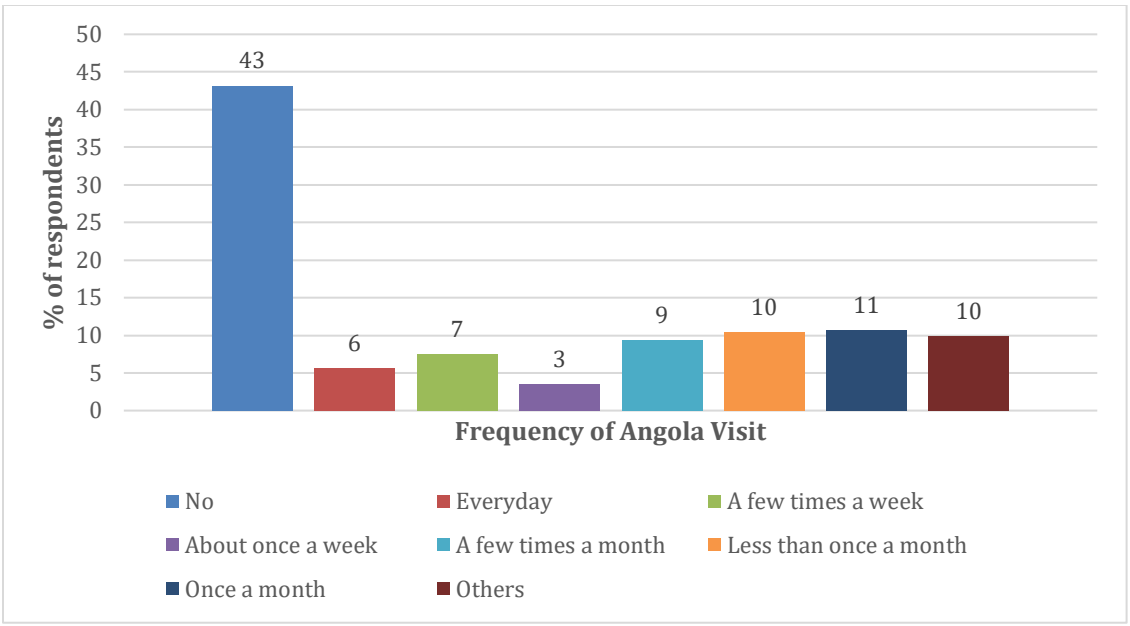


Figure 17: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on their frequency of visiting Angola.

Respondents who visited Angola stayed for a few days (31%), whilst some stayed for some weeks (12%), and the remainder stayed for up to a year (Figure 18).

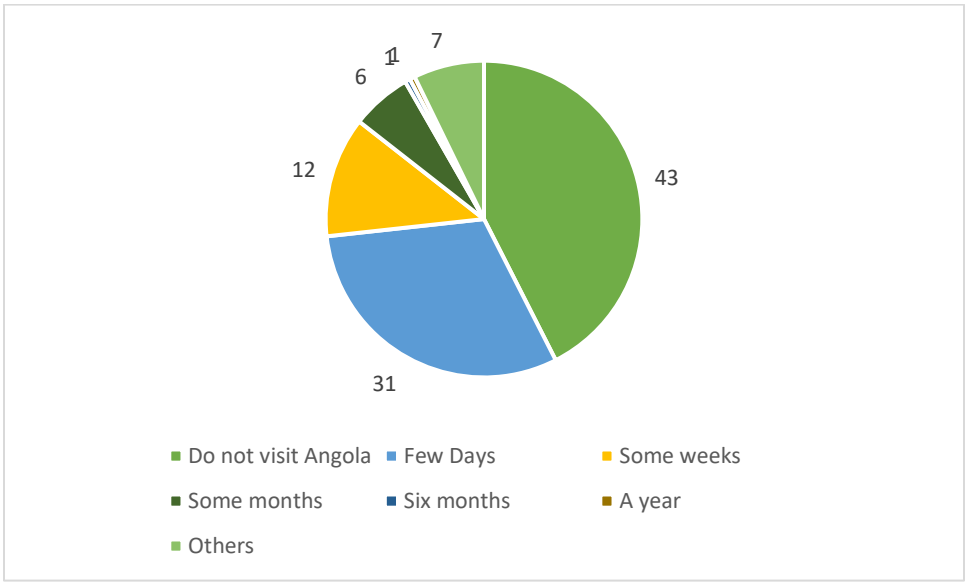


Figure 18: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on their duration of stay when they visited Angola.

Twenty-four per cent of the respondents do not bring animal products from Angola. Only 23% responded that they sometimes bring sheep and goat products from Angola (Table 13). About 19% of the respondents take and bring back their livestock from Angola. Twenty-one per cent of the respondents go to Angola and bring newly purchased animals (Table 13).

Table 13: Respondents in the Omusati and Ohangwena regions of Namibia categorized based on what type of animal and animal products they bring into Namibia from Angola

Criteria	Categories	No. of respondents	%
Respondents bringing in a small stock of products from Angola	**Do not visit Angola**	156	42
	No, but I visit Angola	88	24
	Yes but seldom	25	7
	Yes but sometimes	87	23
	Yes often	9	2
	Yes Always	8	2
	Total	**373**	**100**
Respondents bringing in sheep and goats from Angola	**Do not visit Angola**	148	40
	No	76	20
	The same ones taken to Angola	72	19
	Yes, the newly purchased	77	21
	Total	**373**	**100**

Thirty-eight per cent of the respondents indicated that their animals are never inspected upon entry from Angola, whether as newly purchased animals or the same ones initially taken into Angola (Figure 19). Forty-nine per cent of the respondents indicated that they never take their livestock into Angola (Figure 19).

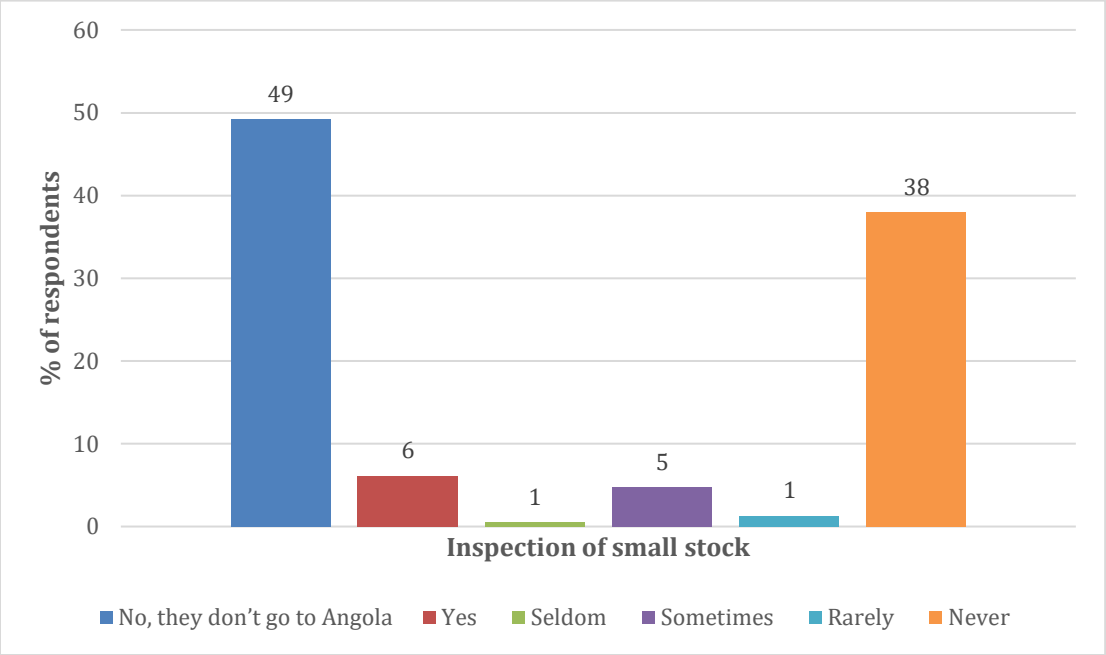


Figure 19: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on whether and how frequently their small stock is inspected upon return from Angola.

Thirty-two per cent of the respondents use Angola-derived sheep and goats to improve their herds, whilst 24% indicated that they purchase the livestock for slaughter (Figure 20). Yet, 42% responded that they do not buy from Angola (Figure 20)

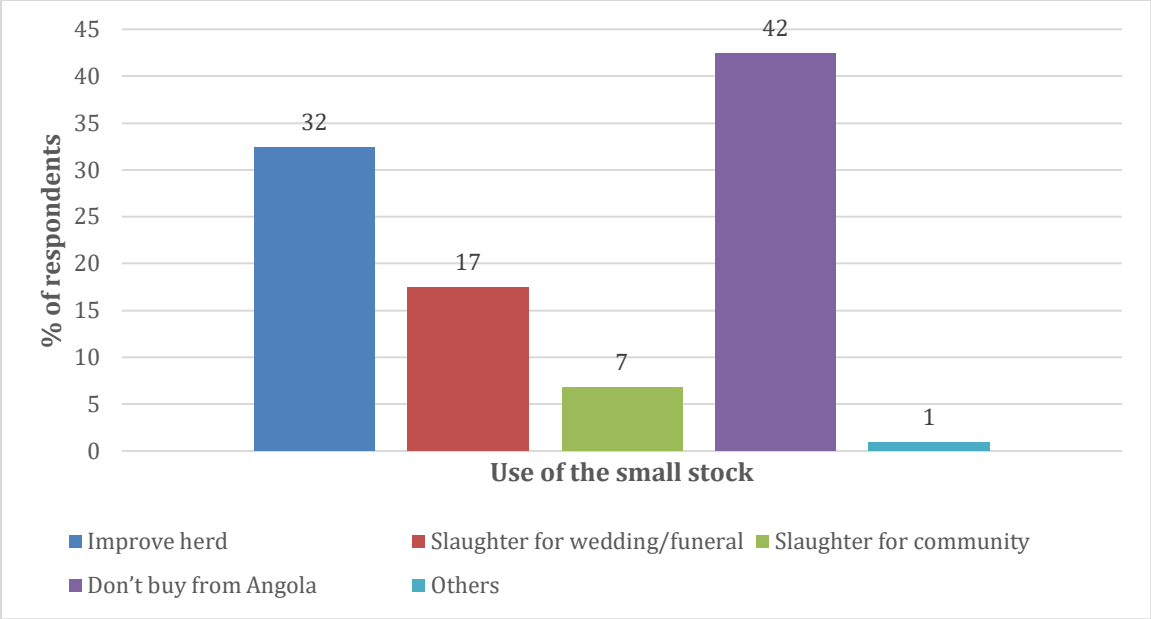


Figure 20: Per cent of respondents in the Omusati and Ohangwena regions of Namibia grouped based on what they use the Angola-derived sheep and goats.

CHAPTER 5

5. Discussion

5.1 Introduction

Peste des petits ruminants was last reported in the Cabinda province in northern Angola in 2012 (Britton et al., 2019; Mantip et al., 2019). Namibia is currently free of PPR and has implemented various strategies to prevent the disease from entering the NCAs of Namibia from Angola (DVS, 2023).

The southward spread of PPR in Angola will increase the risk of an incursion into Northern Namibia. The early detection of an incursion into Namibia will depend on the effectiveness of surveillance and control measures instituted by the veterinary authorities in both Namibia and Angola. Literature on PPR surveillance activities in Angola is scarce, making it difficult to predict the southward spread of the disease.

In addition, the Angola-Namibia border is described as “porous” as there are large portions with no fence between the two countries, thus allowing movements of people and animals to occur at undesignated points (Katunahange B K, 2016). Illegal movements of Namibian farmers crossing into Angola for livestock pastures have been reported in the media (Angula, 2023). Consequently, Namibia must remain vigilant to prevent PPR incursion. This will depend to a certain extent on the vigilance and alertness of agricultural scientific officers who mane the borders and control the movement of livestock and livestock products as well as the ability of the local state veterinarians to recognize and respond quickly in case of an outbreak.

There is therefore a perceived risk of introducing PPR into Namibia by the regular movement of livestock for pastures across the border. The research analysed the knowledge, attitudes, and practices of the local communities in the Omusati and Ohangwena regions of Namibia to gain insights into the possible risk factors for the introduction and spread of PPR from Angola. The survey examined knowledge gaps, attitudes, perceptions, belief systems, and current activities of the communal farmers that may impact the effectiveness of Namibia's surveillance strategies for PPR.

5.2 Demographic Patterns

The gender distribution of livestock farmers in the Omusati and the Ohangwena regions are similar to those reported in a study on rice farming in northern Namibia (Kaida et al., 2017) where male farmers engaged primarily in livestock-related activities and the female farmers were more focused on crop farming. It is worth noting that gender disparities in the agriculture industry can, to a certain extent, be attributed to the limitations imposed on women's access to land (FAO, 2016). The gender distribution may reflect the historical distribution of decision-making power within households, which was often male-dominated in Namibia (Girvan, 1995; Mwetulundila, 2022; Yusuff, 2018). Women traditionally have had less involvement in livestock farming than men because Namibian customary systems have always shifted the power balance towards males (Girma, 2016). Scholars have recommended policy reforms to tackle this pressing issue (Girvan, 1995). Ultimately a more equitable society is the goal but the efforts from the government have not yet made an impact on the gender demographics (Mwetulundila, 2022). This is particularly important given that rural women tend to own small stock (Britton et al., 2019; Kristjanson et al., 2014) which they use for livelihood. Empowering women to manage and make decisions on their livestock will position them to contribute to managing disease risk better (Anderson et al., 2021) and by extension to the effective surveillance of transboundary diseases such as PPR.

In northern Namibia older individuals engage in farming, while younger generations pursue formal employment opportunities in urban areas after completing their education (Girvan, 1995; Mulama & Nambinga, 2016; Wickham, 2023). Farming is regarded as a vital cultural activity mainly for men (Togarepi et al., 2018), and previous studies have reported that elderly individuals generally serve as livestock caretakers in the villages (Mulama & Nambinga, 2016). The targeted awareness campaign methods must be tailored to meet the needs of the elderly who are likely to be present in the villages.

The elderly, post-independence, may not have had the opportunity to pursue higher education, especially those in rural areas (Faust, 2016). Secondary education is important because at that level students are taught agricultural subjects which may include livestock production and disease control in livestock. This could

explain why many respondents (99%) supported vaccinating livestock, isolating purchased livestock (85%) and carrying out a post-mortem for animals that died of unknown causes (87%).

In Ovambo and Ovaherero cultures, livestock ownership is a status symbol (Togarepi et al., 2018). Thus, men often keep livestock to adhere to this societal norm. Older people uphold this tradition more than younger people (Togarepi et al., 2018). Goats are considered resilient animals that withstand harsh environments, typical of the NCAs (Nair et al., 2021; Sejian et al., 2021). In Ovambo culture, goats are the preferred small-stock species to raise (Marius et al., 2020) and cattle hold significant cultural value as status symbols and are often given as gifts for weddings or used in funerals (Thomas et al., 2014).

5.3 Knowledge Assessments

The local Namibia radio networks broadcast in various local languages in the different constituencies. Local leaders, particularly regional councils, utilize this medium to communicate important information about community development issues and general announcements. In a study done in southern Africa rural areas, it was observed that about 50% of the farmers use the radio as a source of agricultural knowledge (Adamides & Stylianou, 2018). In another study done in Nigeria, radio was noted as essential in creating awareness among farmers (Danjuma et al., 2021). The radio is credited for its broad reach and low cost (Kumari et al., 2014). Therefore, radio communication in the NCAs is crucial for relaying important information and should be used to educate the community on the prevention of PPR in Namibia.

The state veterinary office represents the face of the competent authority and is responsible for the surveillance, prevention and control of infectious diseases including PPR. It is highly visible in the NCAs through various public education initiatives. They also participate in capacity-building initiatives and projects in the local communities. Similar observations were seen in South Africa and Australia (Jenjezwa & Seethal, 2014; Maxwell et al., 2008). Building trust and maintaining regular engagement with farmers is crucial in increasing awareness and enabling early response mechanisms in the event of an outbreak of PPR in Namibia. This will allow the veterinary office to contact farmers and promptly execute control measures.

Private veterinary services are, however, scarce in the NCAs. For example, the Omusati region has only two state veterinarians and no private practitioners. Before independence and the period after that, the government of Namibia has always provided state veterinary services and agricultural inputs to the farmers in communal areas at heavily subsidised fees (Jona & Terblanché, 2018). This could explain the absence of private practitioners in most northern communal areas. The private veterinarian could be the first point of contact for farmers and perceived delays to early reporting may occur if their services are not utilized. Farmers seeking the advice of veterinary officials for a proper diagnosis, can help optimize disease diagnosis, sampling, and surveillance activities. Farmers who avoid private veterinarians are possibly reluctant to pay for veterinary services.

The extension office is an important source of information on livestock diseases. The extension office has long been regarded as a crucial source of information on animal husbandry and livestock management for rural communities (Zwane, 2014). Its trusted reputation has been earned over time and it plays a vital role in the communities it serves (Hoffmann et al., 2009). However, extension services in North Central Namibia have had some challenges with service delivery in the past (Thomas, 2012), and the farmers may have low participation in the extension activities (Kumba, 2003). In Nigeria, a study found that even though most of the surveyed rural farmers relied on extension agents for agricultural information, they expressed constraints such as extension workers' personalities, language barriers, lack of feedback and other similar factors as confounding (Galadima, 2014). Proper capacity building of the extension officers can enhance the extension service delivery (Zwane, 2014). The extension offices can serve as an arm to extend PPR knowledge amongst the farming community in the NCAs of Namibia.

In communal areas, access to internet services is limited, making it difficult for farmers to use these platforms effectively (Mbagwu et al., 2018). Additionally, the farmers have no easy access to towns or centres to purchase newspapers or magazines. In the event of a PPR outbreak, internet, magazines, and newspapers may need to be complemented with other communication channels such as the local state veterinary office and extension office, with the announcements being made on the local radio networks.

Television can be a very efficient medium for the dissemination of information on livestock diseases where access is possible, as in Botswana's Boteti sub-district (Gababolokwe & Hulela, 2014). In rural areas, the wide use of the TV is a challenge because of lack of electricity. The need for livestock information on television was identified in the Katima Mulilo region of Namibia (Mabuku, 2015). However, in the Yobe State in Nigeria, television was the least sought-after source of information (Galadima, 2014). Therefore, television may not be as effective as the radio in disseminating information to the communities in this study.

Many farmers were not familiar with PPR probably because PPR is not currently present in Namibia, and there is no vernacular name for the disease. However, farmers may better recall other transboundary animal diseases, such as foot-and-mouth disease and contagious bovine pleural pneumonia, for which annual vaccinations are practised in the NCAs. Since the Directorate of Veterinary Services (DVS) does biennial serosurveys, the direct participation in the DVS serosurvey activities may have helped some few farmers to improve their PPR knowledge (DVS, 2023). The general lack of knowledge among the surveyed farmers poses a risk of underreporting and the potential spread of PPR should it be introduced to the NCAs. DVS can help the farmers to bridge the PPR information gap by developing strategies to raise awareness of the clinical signs and encouraging disease reporting, especially in this study area. Expanding surveillance activities by building capacity among farmers is essential to prevent an outbreak of PPR in the NCA. This will empower farmers to identify suspected clinical signs and promptly report them to veterinary officials for further management.

The study discovered that surveyed farmers generally recognize sick sheep and goats through clinical signs such as weakness, depression, bodily discharges, and diarrhoea. These clinical signs are like those of PPR, particularly weakness, depression, bodily discharges, and diarrhoea. However, anorexia, fever, and recumbency were not identified as frequently as the abovementioned signs. It is possible that farmers do not have access to thermometers to assess fever. Anorexia may be challenging to observe as sheep and goats are not hand-fed but are left to forage independently, sometimes without an attending shepherd. Ability to recognize clinical signs of PPR can help early reporting mechanisms.

In general, rural farmers are older and more experienced and therefore more proficient at identifying clinical signs of livestock diseases. The communal nature of rural living also provides opportunities for sharing information and practices, especially regarding goat and cattle-related issues. If farmers can recognize the sudden increase in these clinical signs in a large proportion of animals and report them promptly to the nearest veterinary office, there is a decent chance of early detection of a PPR outbreak. However, targeted awareness campaigns and capacity-building initiatives may be necessary to bridge the knowledge gaps.

Importing sheep and goats from Angola can increase the chances of exposure of PPR. The PPR incursion in the Cabinda province of Angola was due to the illegal importation of 55 sheep and goats from the DRC (Chazya et al., 2015). Small stock are imported from Angola for various purposes, including slaughter and improving herd quality. Therefore, effective disease control measures depend on the farmer's knowledge and behaviour regarding disease transmission and the movement of livestock.

Farmers who acknowledged that transferring sheep and goats between locations can increase the risk of disease transmission among livestock are more likely to comply with movement restrictions because they understand the risks involved. The indifferent farmers, likely due to insufficient knowledge on the subject are likely to increase the chances of under reporting. Capacity-building initiatives could shift these individuals towards a more affirmative stance to address this knowledge gap. However, the survey demonstrates that farmers are aware of the potential risks associated with livestock movements and the need for appropriate mitigation measures.

Comprehending the rationale behind quarantining newly purchased sheep and goats is critical. Surveyed farmers agree that it serves to verify incubation and, most importantly, to prevent the introduction of potentially infected sheep and goats into a new establishment. These farmers' viewpoints align well with the acceptable biosecurity standards in livestock farming, which advocate for quarantining newly acquired sheep and goats. The value of quarantine may be confounded by the lack of infrastructure or prior disease outbreaks due to unquarantined sheep and goats. Farmers who understand the role of quarantining animals

are more likely to adopt quarantine measures, particularly for sheep and goats imported from Angola, thus reducing the risk of PPR introduction.

The conflicting opinions about whether PPR is in Namibia could be attributed to various factors. The ones who answered correctly could be due to the awareness efforts by DVS. Those who answered incorrectly could be due to other factors, such as needing a local vernacular name for the disease. In addition, the clinical signs of PPR can resemble those of other commonly encountered conditions like diarrhoea. The survey showed that farmers have uncertainty and lack of information regarding PPR in Namibia. Capacity building in this regards becomes pertinent.

The farmers surveyed in Namibia are aware of the potential problems that could arise in the event of an outbreak of PPR. These include animal mortality, loss of revenue due to the inability to sell animals, and a shortage of animal-derived products such as meat, milk, and hides. It is important to note that farmers who possess this knowledge are more likely to take the necessary measures to prevent an outbreak of PPR. Overall, the farmers are well-informed about the potential problems associated with a PPR outbreak and the strategy that could be employed to avoid it. This knowledge is invaluable in reducing the likelihood of an incursion of PPR in the country.

5.4 Attitudes Assessments

Many rural farmers sell live or slaughtered sheep and goats to earn disposable income that can be used to pay school fees, medical bills, or unexpected emergencies (Marius et al., 2020). Farmers who derive income and get animal-derived products from their small stock are most likely to respond positively to activities that safeguard the health and well-being of their animals.

Keeping track of small stock diseases that may be occurring in neighbouring countries is a good practice. It lets farmers stay informed about potential risks that may come into the country, thus better preparing the farmers for future outbreaks. Specifically, PPR would be one such disease of interest to the farmers. For

farmers who are unaware of its importance, education on disease transmission modalities would be beneficial to them.

By acknowledging that the movement of sheep and goats between Namibia and Angola could contribute to the spread of sheep and goat diseases, including PPR, the surveyed farmers understand the principles of disease transmission. This insight is crucial because an outbreak in Namibia could result from importing infected sheep and goats from Angola. By recognizing this risk, farmers can adjust their practices, accordingly, potentially mitigating the incursion of PPR in the NCAs.

Rigorous regulations governing the movement of livestock along the Namibia-Angola border, and strict control measures should be enforced at the border points. Given that one infected animal can potentially cause a PPR outbreak, the strict monitoring therefore lowers the risk of PPR incursion into Namibia.

Equally, movement controls of sheep and goat movement within NCAs should be enhanced. DVS enforces obtaining a movement permit before any livestock movements takes place between establishments even in the NCAs. The Animal Health Act 1 of 2011 and its regulations mandates the movement of animals from one establishment to another through movement permits (LAC, 2018; Meatboard, 2023). The belief by farmers that permits should be sought demonstrates their understanding and appreciation of the importance of regulating the movement of livestock in NCAs, a key aspect in disease prevention and controls when trace forward and traceback exercises are carried out.

The farmers belief in serosurvey is reinforced by the efforts of the DVS in communal areas. The DVS recently conducted a blood collection for PPR serosurvey before this study's field data collection. The farmers' endorsement of the serosurvey is significant because it demonstrates their backing of the DVS's surveillance activities for PPR. With this positive outlook, farmers are more likely to cooperate fully with the DVS's disease surveillance and control efforts in case of a PPR incursion.

When animals get sick, use of sick bays plays a crucial role in preventing further spread while the sick ones are being attended to. During their recovery and treatment, sheep and goats are kept isolated from the rest

of the animals. The widespread support for sick bay by most of the farmers is significant because separating sick sheep and goats from the rest can help minimize the spread of contagious diseases, such as PPR, in an outbreak.

Another biosecurity practice is the use of isolation facilities for newly received sheep and goats. As imported sheep and goats are often the source of infection for the NCAs, it is believed that isolating them while they are checked for incubation is beneficial. The farmers are aware of this and understand the importance of isolation, meaning that in the event of animal importation, they are likely to isolate them before introducing them to the rest of the flock. Isolation for PPR is quite an effective tool in mitigating an outbreak (Balamurugan et al., 2014).

The surveyed farmers are evenly split on whether they should pay for veterinary services. This is unlike in India, where it was observed that, generally, rural farmers are willing to pay for veterinary services (Kathiravan et al., 2012), especially if they are of good quality and aim to improve their livelihoods (Bardhan, 2010). Farmers not willing or able to pay for veterinary services may be more likely to turn to heavily subsidized government services. Ultimately, the reluctance to pay for veterinary services could result in clinical cases being kept for extended periods before being brought to the state veterinary offices.

The strong conviction among farmers concerning vaccination could be due to routine vaccinations carried out by DVS for various diseases like rabies, contagious bovine plural pneumonia, anthrax, and foot-and-mouth disease. This strong belief in vaccination is important because it means that if an outbreak of PPR were to occur in Namibia and a decision was made to vaccinate small stock to contain it, the farmers are likely to support such efforts. This kind of support from farmers can drastically reduce the spread of PPR and prevent it from being introduced into new areas.

Farmers who acknowledged the significance of conducting post-mortems on goats and sheep that have died of unknown causes are important for surveillance. In the event of an outbreak of an exotic disease, these farmers would be willing to engage veterinary services to conduct post-mortems to determine the cause of

death. The practice of post-mortem examination in cases of unknown deaths is crucial in increasing the probability of detecting PPR in deceased sheep and goats, if present.

5.5 Practice Assessments

Grazing sheep and goats in Angola remains a risk as any infected animal that crosses the border can cause an outbreak (Chazya et al., 2015). Therefore, it is vital to strengthen control measures at border points to mitigate the risk of inadvertently introducing infected sheep and goats back into the country.

Equally, purchasing new animals from Angola increases the likelihood of bringing in infected animals, raising the risk of transmitting transboundary animal diseases like PPR. Thus, the flow of live sheep, goats and animal products from Angola into Namibia could potentially lead to the introduction of infectious diseases such as PPR.

The risk is compounded by the fact that some sheep and goats are never inspected upon return from Angola. Since the border is described as porous, the points of entry are not necessarily the designated border points. Perhaps these animals pass through areas not manned by the agricultural scientific officers. Nonetheless, these practices increase the likelihood of importing sheep and goats infected with PPR. Angola-derived livestock can mix with local herds before slaughter and when they are used for improving herds. Thus, these practices remain a risk factor for PPR incursion in the NCAs of Namibia. Livestock that come from Angola into communal lands can mix with local goats and sheep at the communal grazing lands or watering points. This presents a potential risk of spreading disease in the surrounding area. Due to the absence of demarcated (fenced) establishments, NCAs may be viewed as a giant epidemiological unit.

Irregularly seeing livestock by the farmers poses a risk of not detecting a PPR incursion if it occurs. Early detection of PPR is vital to minimize undetected transmission and to prevent widespread transmission.

Obstacles in accessing veterinary services due to a range of factors such as a lack of available veterinary officials, poor communication networks, inadequate transportation options, and poorly maintained roads, poses a challenge to disease surveillance as clinical cases may go unnoticed and proper clinical management

of these cases may be delayed. In cases where the disease is highly contagious like PPR, early response mechanisms and surveillance become even more critical.

A low percentage of farmers do not seek state veterinarian for diagnosis of diseases. These could be part of the farmers who reported having no access to veterinary services. Additionally, some older farmers prefer to rely on their experience and go directly to pharmacists or use traditional remedies (personal communication). However, there is a lack of published information on the long-term effects of these remedies on animal health and public health. There is also concern that the overuse or unregulated use of traditional remedies may lead to antimicrobial resistance, just like antibiotics (Mushebenge et al., 2021). It is unclear if traditional medicine can effectively treat PPR or prevent clinical signs and aid in animal recovery. Therefore, relying solely on traditional remedies could exacerbate the transmission of PPR if farmers do not consult veterinary services.

It is important to note that seeking advice from a pharmacist in a veterinary case could lead to a missed diagnosis. This could result in delays in identifying new outbreaks and jeopardize the accuracy of national disease databases in the region.

The approach of taking no action when an animal falls ill may prove ineffective in stemming the spread of diseases, such as PPR, as sick sheep and goats can mingle with healthy ones in communal areas, accentuating transmission. Farmers may handle and inspect their livestock for clinical disease to implement treatments recommended by veterinary officials, but proper protective clothing is needed. This raises concerns about potential cross-contamination and the risk of infectious agents spreading to nearby establishments, particularly when sharing equipment and tools.

According to the survey, farmers use vaccination to prevent diseases in sheep and goats. Notably, attitude analyses revealed that 99% of farmers believe vaccination is crucial, yet only 48% put it into practice. Encouraging farmers to utilize this tool can help protect their livestock. Furthermore, exploring factors hindering farmers from practising vaccination can illuminate potential solutions.

According to the study, farmers possess the appropriate mindset regarding isolating their livestock post-purchase (85%) and when they are unwell (94%). However, only 28% of farmers put this into practice by isolating newly bought animals. This can be attributed to the need for more infrastructure to facilitate this process. With only a minority of farmers effectively isolating their animals, there is a potential danger of introducing PPR into the NCAs when purchasing livestock from Angola.

Close monitoring of farmers who purchase livestock from Angola and conducting rigorous border inspections is essential to prevent the introduction of infections into the country. Interestingly, NCA farmers view their livestock as a significant source of wealth and social status in their communities. Thus, rarely sell them off. Based on these purchasing and selling patterns, the risk of infected sheep and goats being sold outside the NCA is minimal.

Angola is now a less attractive destination for Namibians to frequent, purchase, and sell goods. Though there is less movement the risk of importation of transboundary animal diseases such as PPR still remains because PPR is highly contagious.

5.6 Conclusion

The study concluded that there is a moderate risk of PPR incursion into the NCAS of Namibia. The farmers in the study area have limited knowledge of PPR and its clinical signs, but they have knowledge of the general clinical signs and the principles of disease transmission in livestock. They understand the use of isolation and quarantine as disease prevention strategies and are aware of the consequences of a PPR outbreak. However, the ovement of livestock across the Namibia/Angola border at non-designated border points still pose a risk of PPR incursion. It is therefore imperative to increase PPR awareness among the rural farmers in the NCAs, especially those living along the Namibia/Angola border areas. This could be achieved through targeted education campaigns using various channels such as local vernacular radio stations, extension services and state veterinarians. Nonetheless, the current PPR surveillance and other efforts by the competent authority to prevent this PPR incursion or outbreak can be maintained.

5.7 Recommendations

The following recommendations can be made:

1. There is a need to increase awareness of PPR among the rural farmers in the NCAs of Namibia, especially for those living in the areas under the study (Omusati and Ohangwena regions) through targeted capacity building initiatives involving state vet and extension officers, using the local radio and other means of communication. This may also include topics such as the basics of disease epidemiology and socioeconomic impacts of disease outbreaks.
2. Though the farmers in the areas of study are well versed in disease prevention strategies, they need to strengthen their role in the regulated animal movement, and isolation and quarantine measures. The DVS may need to enhance the enforcement of regulations for adherence purposes. It is also suggested to increase the use of subsidized quarantine and isolation facilities for Angola-derived livestock.
3. The farmers should be encouraged to use PPE (basic protective clothing such as gloves, boots, and overalls) when examining sick animals, especially when the diagnosis is not yet established or is unknown. Additionally, farmers should also be trained in how to minimize the risk of disease transmission before and during an outbreak.
4. The farmers should be encouraged to seek veterinary services as the primary source of information and guidance before they can consult the pharmacist or traditional medicines when dealing with sick sheep and goats.
5. The farmers are encouraged to ensure minimum contact between imported sheep and goats from Angola and the resident sheep and goats in Namibia.
6. The farmers should be educated on the benefits of using the designated border points to ensure that all returning livestock are subjected to professional staff inspection upon return from Angola. The regulatory authorities may need to increase border patrols.

7. Further studies may be needed to evaluate professional staff on their knowledge of PPR, the applicable government policies, and expert opinions on the risks of the introduction of PPR from Angola into Namibia.
8. Some 35% of the farmers indicated that they do not have access to veterinary services, for various reasons. It is suggested that DVS may need to increase its community engagement programs like farmers' days. Additionally, DVS may enhance ambulatory service to cater to farmers in areas with poor network coverage or challenging terrain.
9. Farmers should be strongly encouraged to seek veterinary assistance for a thorough diagnosis, as this will significantly improve the detection of infectious diseases like PPR and enhance overall surveillance efforts.

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APPENDICES

Appendix 1: Ethics Approval within the Faculty of Agriculture, Engineering and Natural Sciences at the University of Namibia for the PPR KAP survey

UNAM
UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: OGC00014 Date: 03 March 2023

This Ethical Clearance Certificate is issued by the University of Namibia Ethics Committee (REC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the ethics committee.

Title of Project: Analysis of the risk of Peste Des Petits ruminants (PPR) introduction into northern communal areas of Namibia from Angola: Perspectives in the Omusati and Ohangwena region

Student/ Staff name: Dr. Brighton Gorejena (Principal researcher)

Student/ staff Number: 103536

Supervisor(s)/ collaborators: Prof. Jannie Crafford

Centre for Research Services

Take note of the following:

1. Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the ethics committee. An application to make amendments may be necessary.
2. Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the ethics committee
3. The Principal Researcher must report issues of ethical compliance to the ethics committee (through the Chairperson) at the end of the Project or as may be requested by the ethics committee
4. The ethics committee retains the right to:

i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected,

ii) Request for an ethical compliance report at any point during the course of the research.

The ethics committee wishes you the best in your research.

Dr Benisiu Thomas (Chairperson Ethics Committee)

Prof. Davis Mumbengegwi (Head, Multidisciplinary Research)

Appendix 2: Ethics Approval within the Faculty of Veterinary Science at the University of Pretoria for the PPR KAP survey

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Veterinary Science
Research Ethics Committee

15 May 2023

CONDITIONALLY APPROVAL

Ethics Reference No	**REC009-23**
Protocol Title	**Analysis of the risk of Peste Des Petits Ruminants (PPR) introduction into the Northern Communal Areas of Namibia from Angola: Perspectives from Omusati and Ohangwena regions**
Principal Investigator	**Dr B Gorejena**
Supervisors	**Prof JE Crafford**

Dear Dr B Gorejena,

We are pleased to inform you that your submission has been conditionally approved by the Faculty of Veterinary Sciences Research Ethics committee, subject to other relevant approvals.

Please note the following about your ethics approval:

1. Please use your reference number (REC009-23) on any documents or correspondence with the Research Ethics Committee regarding your research.
2. Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.
3. Please note that ethical approval is granted for the duration of the research as stipulated in the original application for post graduate studies (e.g. Honours studies: 1 year, Masters studies: two years, and PhD studies: three years) and should be extended when the approval period lapses.
4. The digital archiving of data is a requirement of the University of Pretoria. The data should be accessible in the event of an enquiry or further analysis of the data.

Ethics approval is subject to the following:

1. The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.
2. Note: All FVS animal research applications for ethical clearance will be automatically rerouted to the Animal Ethics committee (AEC) once the applications meet the requirements for FVS ethical clearance. As such, all FVS REC applications for ethical clearance related to human health research will be automatically rerouted to the Health Sciences Research Ethics Committee, and all FVS applications involving a questionnaire will be automatically rerouted to the Humanities Research Ethics Committee. Also take note that, should the study involve questionnaires aimed at UP staff or students, permission must also be obtained from the relevant Dean and the UP Survey Committee. Research may not proceed until all approvals are granted.

NOTES: Conditionally approved pending the following (and to ensure that rerouting is not delayed).

1. Obtaining ALL other relevant approvals.

2. Although DALRRD Section 20 approval will not be necessary, it is still recommended to obtain a letter (or email) stating that the study is exempted from DALRRD Section 20 approval.

Room 8-6, Arnold Theiler Building
University of Pretoria, Faculty of Veterinary Science
Private Bag X04, Onderstepoort 0110, South Africa
Tel +27 (0)12 529 8300
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Faculty of Veterinary Science
Fakulteit Veeartsenykunde
Lefapha la Disaense tša Bongakadiruiwa

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Veterinary Science

We wish you the best with your research.

Yours sincerely

Mrs. MR Watson-Kriek
Chairperson (acting): Research Ethics Committee

Room 8-6, Arnold Theiler Building
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Gmail Brighton Gorejena <bbbgore@gmail.com>

Exemption from DALRRD Section 20 Approval

2 messages

Brighton Gorejena <bbbgore@gmail.com> Thu, May 18, 2023 at 9:55 AM
To: MarnaL@dalrrd.gov.za
Cc: Jannie Crafford <jannie.crafford@up.ac.za>

Good day, Ms Marna.
My name is Brighton, an Msc GOH student at the University of Pretoria. I applied for Ethics Approval (REC009-23) for a qualitative study to be conducted in Namibia. Attached is the response from the Ethics Committee. I would like to request confirmation that the present study is exempted from DALRRD Section 20 Approval, as per the attached letter's recommendation.
Regards
Brighton u21697932

UP_ETH_VET_I.pdf
107K

Grietjie De Klerk <Grietjie@dalrrd.gov.za> Wed, May 24, 2023 at 8:42 AM
To: "bbbgore@gmail.com" <bbbgore@gmail.com>
Cc: Marna Laing <MarnaL@dalrrd.gov.za>, "jannie.crafford@up.ac.za" <jannie.crafford@up.ac.za>

Dear Brighton

Thank you for reaching out to us. We do not have any mandate to evaluate biosafety of any research in Namibia. Please ensure that you adhere to all the Namibian requirements. If you are only bringing back "paperwork" from Namibia, a Section 20 is not necessary at all. You may proceed with your study.

Good luck.

Kind regards

Dr Grietjie de Klerk

Deputy Director

Sub-Directorate: Epidemiology

Directorate: Animal Health

Department of Agriculture, Land Reform and Rural Development

Cell: 082 495 3207

Tel: 012 319 7412

Fax: 012 319 7470

Web: www.dalrrd.gov.za

From: Marna Laing <MarnaL@Dalrrd.gov.za>
Sent: Wednesday, 24 May 2023 08:23
To: Grietjie De Klerk <Grietjie@Dalrrd.gov.za>
Subject: FW: Exemption from DALRRD Section 20 Approval

Kind Regards

Marna Laing

From: Marna Laing
Sent: Tuesday, May 23, 2023 1:22 PM
To: Grietjie De Klerk <Grietjie@Dalrrd.gov.za>
Subject: FW: Exemption from DALRRD Section 20 Approval

As discussed.

Kind Regards

Marna Laing

From: Brighton Gorejena <bbbgore@gmail.com>
Sent: Thursday, May 18, 2023 9:56 AM
To: Marna Laing <MarnaL@Dalrrd.gov.za>
Cc: Jannie Crafford <jannie.crafford@up.ac.za>
Subject: Exemption from DALRRD Section 20 Approval

EXTERNAL EMAIL: This email originated outside of "DALRRD Environment". CAUTION: Do not click on links or open attachments unless you recognize the sender and know the content is safe.

[Quoted text hidden]

Appendix 3: Ethics Approval within the Faculty of Humanities at the University of Pretoria for the PPR KAP survey

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Humanities 100
Since 1919

12 July 2023

Dear Dr B Gorejena

Project Title:	Analysis of the risk of Peste Des Petits Ruminants (PPR) introduction into the Northern Communal Areas of Namibia from Angola: Perspectives from Omusati and Ohangwena regions
Researcher:	Dr B Gorejena
Supervisor(s):	Prof JE Crafford
Department:	Veterinary Tropical Diseases
Reference number:	21697932 (REC009-23)
Degree:	Masters

I have pleasure in informing you that the above application was **approved** by the Research Ethics Committee on 12 July 2023. Please note that before research can commence all other approvals must have been received.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely,

Prof Karen Harris
Chair: Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: tracey.andrew@up.ac.za

Room 7-27, Humanities Building, University of Pretoria, Private Bag X20, Hatfield 0028, South Africa
Tel +27 (0)12 420 4853| Fax +27 (0)12 420 4501|Email pghumanities@up.ac.za | www.up.ac.za/faculty-of-humanities

Appendix 4: Farmer's consent form in the PPR KAP survey for Omusati and Ohangwena regions of Namibia

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Veterinary Science

PPR Survey Consent Form

Good morning/afternoon/evening ……..

My name is Dr. Brighton Gorejena, working at the University of Namibia, based at Ogongo Campus in Omusati Region. I am conducting a survey to assess the Knowledge, Attitudes, and Practices (KAP) of communities adjoining the Namibia/Angola border in the Omusati and Ohangwena regions, on the disease of goats and sheep called *Peste des petits* Ruminants (PPR).

The information collected will help us to understand the awareness of the risks posed by this disease and the activities currently in place for its prevention and control. We will be asking other people in Omusati and Ohangwena regions the same questions to understand the awareness, preparedness, and risk factors associated with this disease of sheep and goats.

The survey will take approximately 30 minutes to complete. Be assured that your identity will remain anonymous as the participants are given unique codes to identify them. Additionally, the answers to the questions will remain strictly confidential. The data generated will be solely used for research purposes. The outcomes of the research findings will be communicated to the same communities after the successful completion of the studies. The primary data collected will be securely stored as software and hard copies in a university repository. The disposal of data is in line with acceptable environmental standards. Although your response is of utmost importance to us, your participation in this survey is entirely voluntary. Should you feel the need to, you may withdraw from the study at any time without any negative consequences.

Ethical clearance has also been granted for this research. The ethical clearance reference number is **OGC00014**.

Do you consent to be part of this survey?

YES/NO

Signed: _____Date:_____

100 YEARS OF VETERINARY EDUCATION

Room 2-27, Paraclinical Building
University of Pretoria, Private Bag X04
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Faculty of Veterinary Science
Fakulteit Veeartsenykunde
Lefapha la Disaense tša Bongakadiruiwa

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
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Faculty of Veterinary Science

PPR Survey Consent Form

Owa nangalapo/ Owa Uhalapo / Owa tokelwapo Nawa
……..

Edina lange ame Dr Brighton Gorejena, ohandi longo ko shiputudhilo shelongo lo pombada ko University ya Namibia kOgongo. Ohandi kongo omauyelele enasha neshiivo, omikalo nde nomilandu edi hadilongifwa kova kalimo ava havadi popepi neengaba da Namibia na Angola moshikandjohololo shOmusati no mOhangwena, shinasha no mukifi woikombo needi wo *Peste des petits* Ruminants (PPR).

Ouyelele hatu ka ongela apa otawu tu vatele oku udako kutya oshiwana oshi shi shifike peni kombinga yomukifi owu, noshowo omikalo no milandu hadi longifwa oku kelela noku hakula omukifi owu wo PRR. Oha tu ka pula ova kalimo vomo shikandjohoololo sha'Omusati nOhangwena opo tu udeko kutya ovanhu oveshi shi shifike peni kombinga yomu kifi owu, nosho yo kutya ove lilongekida shifike peni ngeenge tashiya komukifi owu, nosho yo omaupyakadi enasha nomukifi ou.

Omapekapeko aa ota ka kwata ominute o30. Oha tukoleke kutya Omauyelele otaa ka shangwa nomadina oipupulu, meenomola ile momadidiliko amwe po opo ku kalekwepo eameno lo va kufi mbinga, ova kufi mbinga aveshe ota va ka pewa onomola yo ku va dimbulula. Omanyamukulo hatu ka pewa apa itaa ka pewa nande omnhu umwe vali ina pumbwa oku a mona. Ouyelele ha tu kamona apa oomapekapeko ashike. omauyelele oo taa ka monika konima yomapekapeko aa otaa ka pewa ova kalimo vo moitukulwa oyo tuu eyi konima yaashi twamana okwaatula kumwe. Omauyelele aeshe taa ongelwa momapekapeko omu otaa ka tuvikilwa noukeka koUniversity. Omawi aa taa kaekelwashi otaekelwashi pomilandu da tambulwako. Nande omanyamukulo to ke tu pa nena okwafimana neenghono adishe kushe, ekufombinga momapekapeko aa o lo pe liyambo loye mwene. Nongeenge owuudite kutya ino hala vali oku twikila oku kufa ombinga momapekapeko, oto dulu o ku likufamo efimbo keshe, ndele kuna eshi to ningwa nande.

Epitikilo lopambelewa lokuya komesho nomapekapeko aa opo lili. Tali kwashilipalekwa no nomola **OGC00014**.

Owa tokola oku kufa ombinga moma pekapeko aa?

Eeno / Aye

Eshaino: _____Efiku:_____

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Appendix 5: Farmer's questionnaire form for the PPR KAP survey in the Omusati and Ohangwena regions of Namibia

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KNOWLEDGE ATTITUDES AND PRACTICES (KAP) SURVEY QUESTIONNAIRE ON PPR IN NAMIBIA

Research Topic:

ANALYSIS OF THE RISK OF PESTE DES PETITS RUMINANTS (PPR) INTRODUCTION INTO NORTHERN COMMUNAL AREAS OF NAMIBIA FROM ANGOLA: PERSPECTIVES FROM OMUSATI AND OHANGWENA REGIONS

Dear Omusati/Ohangwena small stock farmer,

We are carrying out a study to analyze the risk of the introduction of Peste des Petits Ruminants (PPR) into the northern communal areas of Namibia from Angola, using the Omusati and Ohangwena regions as case studies. Your constituency borders Angola, where the disease was last reported in Cambinda province, in Angola. The research endeavors to understand your perspectives on the risk of Peste des petits Ruminants (PPR) introduction into the Omusati and Ohangwena regions, and its potential socio-economic impact on your livelihoods.

Therefore, your participation in this survey is instrumental as it helps us understand the awareness, knowledge, and preparedness level of PPR among sheep and goat farmers in the regions. Your responses will be used to support the development of strategies by the relevant competent authorities to prevent the introduction and spread of PPR in Namibia.

The survey will take approximately 30 minutes to complete. All responses will be kept confidential and anonymous.

Thank you for your participation.

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Biographical Details

1 Region & Constituency *

- [ ] Omusati, Raucana
- [ ] Omusati, Onesi
- [ ] Omusati, Outapi
- [ ] Omusati, Anamulenge
- [ ] Omusati, Okalongo
- [ ] Omusati, Etayi
- [ ] Ohangwena, Ongenga
- [ ] Ohangwena, Engela
- [ ] Ohangwena, Oshikango
- [ ] Ohangwena, Ondobe
- [ ] Ohangwena, Omundaungilo
- [ ] Ohangwena, Okongo

2 What is your gender? *

- [ ] Male
- [ ] Female
- [ ] Prefer not to say

3 Which of the following best describes your age group? *

- [ ] 18-24
- [ ] 25-34
- [ ] 35-44
- [ ] 45-54
- [ ] 55-64
- [ ] 65-74
- [ ] 75 or older

4 What is the highest education level you completed? *

- [ ] Did not attend school
- [ ] Primary school
- [ ] Secondary school
- [ ] High school
- [ ] College/University Diploma
- [ ] College/University degree
- [ ] Other (Please Specify)

5 What is your capacity/role? *

- [ ] Full time farmer
- [ ] Part time farmer
- [ ] Livestock keeper
- [ ] Authorised person
- [ ] Other (Please Specify)

6 What is your farming system? *

- [ ] Communal
- [ ] Commercial
- [ ] Emerging commercial
- [ ] Agro-Pastoral
- [ ] Other (Please Specify)

7 Do you keep small stock? *

- [ ] No
- [ ] Yes, goats only
- [ ] Yes, sheep only
- [ ] Yes, sheep and goats

8 Do you keep cattle? *

9 What is your herd size and predominant breeds? *

Knowledge Assessments

10 Where do you get information about important diseases of sheep and goats?*

- [ ] Local state veterinary office (Vet/AHT)
- [ ] Private veterinarian
- [ ] Internet
- [ ] Newspaper/Agricultural bulletins
- [ ] TV
- [ ] Agricultural Extension Office
- [ ] Social Media
- [ ] Other (Please Specify)

11 How do you tell if your sheep and goats are sick? *

- [ ] They stop to eat and drink
- [ ] They just lie down
- [ ] They look weak and depressed
- [ ] They have discharges from the nose, mouth, anus etc
- [ ] They have diarrhoea
- [ ] They have an elevated body temperature (fever)
- [ ] Other (Please Specify)

12 Can the movement of sheep and goats from one place to another transmit livestock diseases?*

- [ ] Yes
- [ ] No
- [ ] I am not sure
- [ ] I do not know

13 Why do you think newly purchased sheep and goats are quarantined before mixing with others?*

- [ ] To make sure that they are not incubating a disease
- [ ] It is not necessary
- [ ] I do not know
- [ ] Other (Please Specify)

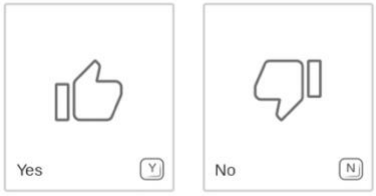
14 Have you heard about a disease called *Peste des petits ruminants* (PPR)?*

- [ ] Yes
- [ ] No
- [ ] I am not sure

15 Do you think *Peste des petitis ruminants* is present in Namibia? *

- [ ] Yes
- [ ] No
- [ ] I am not sure
- [ ] I do not know

16 Do you know of any clinical signs of *Peste des petits ruminants*? *



17 What do you think are the problems posed by an outbreak of Peste des petits ruminants in Namibia?*

- [ ] Farmers will not be able to sell sheep and goats
- [ ] Sheep and goats may die
- [ ] It may cost the farmer and government money to control it
- [ ] Farmers may not get meat, milk and hides from the sick small stock
- [ ] I am not sure
- [ ] I do not know
- [ ] Other (Please Specify)

18 What do you think can be done to prevent *Peste des petits ruminants* in Namibia?*

- [ ] Move sheep and goats with movement permits
- [ ] Getting more information about the disease (creating an awareness)
- [ ] Getting more information about the disease (creating an awareness)
- [ ] Quarantine newly purchased animals
- [ ] Isolate sick animals
- [ ] Treat animals only as advised by the veterinarian
- [ ] Avoid mixing your animals with strange animals
- [ ] Controlling movement of animals and products at the border points
- [ ] Other (Please Specify)

Attitude Assessments

19 Why do you farm with sheep and goats?*

- [ ] It is prestigious
- [ ] It is part of my culture
- [ ] To make an income out of farming
- [ ] I do not know
- [ ] To get products like milk, meat and hides when I need them
- [ ] Other (Please Specify)

20 Are diseases of sheep and goats in another country important for Namibia to think about?*

- [ ] Yes
- [ ] No
- [ ] Not sure

21 Do you think the movement of sheep and goats between Namibia and Angola can increase the chances of transmission of sheep and goats diseases?*

- [ ] Yes
- [ ] No
- [ ] I am not sure

22 Do you think livestock movement at the Namibia/Angola border, should be strictly controlled?

0 1 2 3 4 5 6 7 8 9 10

Strongly disagree Strongly agree

23 Is it important to routinely collect blood samples from sheep and goats to screen for diseases such as *Peste des petits ruminants*?

0 1 2 3 4 5 6 7 8 9 10

Strongly disagree Strongly agree

24 Do you think the movement of sheep and goats from one place to another in the Northern Communal Areas (NCA) should be controlled?*

- [ ] Yes
- [ ] No
- [ ] Not sure
- [ ] I do not know

25 Do you think it is important to have facilities to isolate newly received sheep and goats?*

- [ ] Yes
- [ ] No
- [ ] Not sure
- [ ] I do not know

26 Is it necessary to have a sick bay or separate place to keep sick animals?*

- [ ] Yes
- [ ] No
- [ ] Not sure
- [ ] I do not know

27 Do you think farmers should pay for veterinary services?*

- [ ] Yes
- [ ] No
- [ ] Not sure
- [ ] I do not know

28 Do you think it is important vaccinate sheep and goats to prevent them from getting diseases?*

- [ ] Yes
- [ ] No
- [ ] Not sure
- [ ] I do not know

29 Do you think it is always necessary to first obtain a movement permit before moving sheep and goats?*

- [ ] Yes
- [ ] No
- [ ] Not sure
- [ ] I do not know

30 Is it important for a post-mortem to be carried out on goats and sheep that died of an unknown cause?*

- [ ] Yes
- [ ] No
- [ ] Not sure
- [ ] I do not know

Practices Assessments

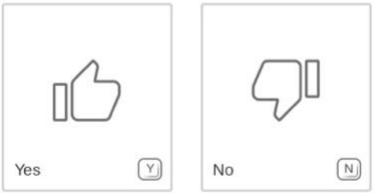
31 Where do you graze your sheep and goats?*

- [ ] Within the region
- [ ] In other NCA regions
- [ ] In Angola
- [ ] Other (Please Specify)

32 How often do you see or examine your sheep and goats?*

- [ ] Always
- [ ] Usually
- [ ] Sometimes
- [ ] Rarely
- [ ] Never

33 Do you have some basic protective clothing (overalls, boots, gloves etc) to use in handling sick sheep and goats?*



34 What do you do when your sheep and goats is sick?*

- [ ] Do nothing
- [ ] Salvage slaughter
- [ ] Treat with traditional medicines
- [ ] Call or visit some local pharmacist and get some medicines
- [ ] Call some friends or colleagues and get advice
- [ ] Call or take to the nearest state veterinary office
- [ ] Call or take to the nearest private veterinarian
- [ ] Other (Please Specify)

35 Should you need veterinary assistance, are you able to reach them?*

- [ ] Yes
- [ ] No, They are not available
- [ ] No, There is a poor network in my area
- [ ] No, there are bad roads to transport the animals
- [ ] No, I do not have suitable transport or provision to hire one
- [ ] Other (Please Specify)

36 How do you prevent your sheep and goats from getting sick?*

- [ ] Vaccination
- [ ] Deworming
- [ ] Tick control
- [ ] Prophylactic antibiotic treatment
- [ ] Proper feeding and mineral supplementation
- [ ] Other (Please Specify)

37 Where do you purchase sheep and goats?*

- [ ] Within region
- [ ] Other regions
- [ ] South of VCF
- [ ] Angola
- [ ] South Africa
- [ ] Other (Please Specify)

38 Do you isolate newly acquired sheep and goats?*

- [ ] No
- [ ] Yes, for 14 days
- [ ] Yes, for 21 days
- [ ] Yes, for 30 days
- [ ] Sometimes
- [ ] No, i do not know if it is necessary
- [ ] No, I do not believe it is necessary
- [ ] No, I do not have proper infrastructure to do so
- [ ] Other (Please Specify)

39 How often do you sell sheep and goats? *

- [ ] Always
- [ ] Usually
- [ ] Sometimes
- [ ] Rarely
- [ ] Never

40 Where do you sell your sheep and goats?*

- [ ] Within the region
- [ ] In other regions of NCA
- [ ] South of VCF (via quarantine)
- [ ] Angola
- [ ] South Africa
- [ ] Other (Please Specify)

41 Do you visit Angola? How often?*

- [ ] No
- [ ] Everyday
- [ ] A few times a week
- [ ] About once a week
- [ ] A few times a month
- [ ] Less than once a month
- [ ] Once a month
- [ ] Other (Please Specify)

42 How long do you stay in Angola if you visit?*

- [ ] No, I do not visit Angola
- [ ] Few days
- [ ] Some weeks
- [ ] Some months
- [ ] Six months
- [ ] A year
- [ ] Other (Please Specify)

43 When you visit Angola, do you bring along cattle or small stock meat and meat products and how frequently?*

- [ ] No, I do not visit Angola
- [ ] No, but I visit Angola
- [ ] Yes, but seldom
- [ ] Yes, sometimes
- [ ] Yes, often
- [ ] Yes, always

44 When you visit Angola, do you bring along cattle, sheep or goats?*

- [ ] I do not visit Angola
- [ ] No
- [ ] The same ones I would have taken to Angola
- [ ] Yes, the newly purchased ones from Angola

45 What do you do with the cattle, sheep or goats obtained from Angola?*

- [ ] Improve the herd
- [ ] Local slaughter for a wedding or funeral
- [ ] Slaughter for local communities
- [ ] I do not buy from Angola
- [ ] Other (Please Specify)

46 Are your sheep and goats inspected by a qualified veterinary official upon return from Angola?*

- [ ] No, my sheep and goats do not go into Angola
- [ ] Yes
- [ ] Seldom
- [ ] Sometimes
- [ ] Rarely
- [ ] Never

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Oshipalanyolo:

Omapekapeko enash nomaupyakadi omukifi wiikombo needi owo tau dulu oku ya moshilongo tawu dilile mo Angola: Omaudeko mOmusati/OhaNgena region.

Omuna falama Omufimanekwa wo mOmusati/Ohangwena,

Oha tu nigni oma pekapeko enasha nomkifi ou wo Pestes des Peptits Ruminants (PPR) haukwata iikombo Needi. Omukifi ou otawu dulu okuya meni loshilongo tau dilile mo Angola. Ongee Ohatu ka pula oma pulo mee region edi da shaama na Angola, OMusati nde no Hangwena region. Oshikandjo hoololo shoye oshili uushiinda Na Angola, omu hamudilile omukififi ou. Onghee otwa hala okuu shiive nghe wu uditeko omukifi ou.

Ukufo mbinga loye mo mapekapeko aa olafimana neeghono neenghono adishe, Oshaashi opo ashike hatu dulu oku shiiva ngeenge omu kifi ou wiikombo needi omu wushi tuu, ilo oha mu udu ashike, Nosho yoo okumonya kutya omwe li lokekida ngaheipi ngeenge omukifi owu oweya moshilongo. Oma nyamukulo oye ataa kalongifwa oku koleka etokolo loku etapo omi landu doku keelela omukifi ou waa uye moshilongo

Omapulo ata kwata uule wo minute omilongo natu. Oma nyamukulo oye otaa kwatwa nawa.

Tangi Kelongelo kumwe.

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Biographical Details

1 Oshitukulwa noshikandjohololelwa omo u li?*

- [ ] Omusati, Raucana
- [ ] Omusati, Onesi
- [ ] Omusati, Outapi
- [ ] Omusati, Anamulenge
- [ ] Omusati, Okalongo
- [ ] Omusati, Etayi
- [ ] Ohangwena, Ongenga
- [ ] Ohangwena, Engela
- [ ] Ohangwena, Oshikango
- [ ] Ohangwena, Ondobe
- [ ] Ohangwena, Omundaungilo
- [ ] Ohangwena, Okongo

2 **Oukashike-ko-okanhu**? *

- [ ] Tate
- [ ] Meme
- [ ] Ina hala oku tumbula

3 Ou li mongudu ili pi po yeedula di li moukolololo tava landula?

- [ ] 18-24
- [ ] 25-34
- [ ] 35-44
- [ ] 45-54
- [ ] 55-64
- [ ] 65-74
- [ ] 75 or older

4 Odjapo yoye yo pombada mofikola i li pipo?*

- [ ] Ina ndi ya kofikola
- [ ] oPrimafikola
- [ ] Osekundofikola
- [ ] Osekundofikola
- [ ] Oshiputudilo shopombada noDiploma
- [ ] Oshiputudilo shopombada noDegree
- [ ] Imwe po(i tumbua):

5 Ove oho ningi shike keifano ? *

- [ ] omunafalama efimbo keshe
- [ ] omunafalama efimbo limwe
- [ ] Omukaleli po woimuna
- [ ] omunhu a pitikwa
- [ ] umwe vali,(u tumbula)

6 Ove oho longifa omukalo u lipi po moku faalama?

- [ ] Ofaalamai i nini.
- [ ] Ofaalama ya kula.
- [ ] Ofaalama tai kulu.
- [ ] Ofaalama yoimeno noulifilo woimuna.
- [ ] Umwe vali :

7 Oho faalama noinamweno i nini? *

- [ ] Ahowe
- [ ] oikombo ashike
- [ ] Eedi odo adike
- [ ] Heeno, oikombo needi

8 Oho faalama neengobe ? *

9 Ou na Eengobe ngapi, na odo ludi lilipi po?*

Knowledge Assessments

10 Ouyelele u na sha nomikifi dafimana doikombo needi oho u kufa peni? *

- [ ] Okombelewa yOuhaku noundjolowele woimuna.
- [ ] okOmundokotola woimuna wopaumwene
- [ ] kOmalungula
- [ ] Omoifo-kundaneki
- [ ] okOradio yomudidimbe
- [ ] Okeembelewa dovayakuli vounamapya nounaimuna (agriculture)
- [ ] OkOmalungula
- [ ] pamwe vali ,tumbula po :

11 Oho mono ngahelipi kutya oikombo ilo eedi doye otadi vele? *

- [ ] Oha i ile ohadi kanifa ehalo lokulya nokunwa.
- [ ] oha i ile ohadi nangala ashike pedu.
- [ ] Ohadi kala da leela do kadi li monghalo iwa younamwenyo.
- [ ] Oha i ile ohadi di omeva oma-ekelwashi momayulu oshoyo momakanya nokonima.
- [ ] Oha i ile ohadi kala da ndjena ile i na /dina oupyu wa londa.
- [ ] They have diarrhoea Ohadi/ ha i efa onyata ya yula.
- [ ] imwe i vali, i tumbula:

12 Omalinyengo oimuna kudja ponhele imwe okuuka konhele ikwao ohaa dulu oku tandavelifa omikifi moimuna? *

- [ ] Heeno
- [ ] Ahowe
- [ ] Ka ndi na eshiivo musho nawa.
- [ ] Kandina eshiivo musho nande nande.

13 Omolwashike oimuna oyo opo ya landwa ha i li kalekelwa monhele imwe manga ina i tulwa mumwe naayo ya hangika mo? *

- [ ] Opo ku kwashilipalekwe kutya ina i umbata omikifioku yadja.
- [ ] Ina shi fimana.
- [ ] Kandi na eshiivo musho.
- [ ] Omatomheno amwe vali,a tumbula:

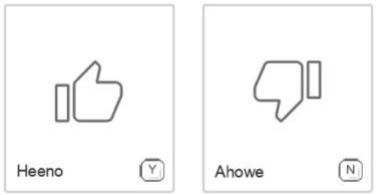
14 Owa uda kombinga yomukifi wo *Peste des petits ruminants* (PPR)?*

- [ ] Heeno
- [ ] Ahowe
- [ ] kandi na eshiivo musho nawa.

15 Mokutengeneka kwoye , omukifi wo *Peste des petits ruminants* omo u li moNamibia?*

- [ ] Heeno
- [ ] Ahawe
- [ ] Kandi na eshiivo musho nawa.
- [ ] Kandi na eshiivo musho nande nande.

16 Ou shi omadidiliko o *Peste des petits ruminants* ?*



17 Omaupyakadi elipi u wete haa etwa ketukuluko lo *Peste des petits ruminants* moNamibia?*

- [ ] Ova nafaalama itava ka dula oku landifa oikombo needi.
- [ ] Oikombo needi ota i ile otadi dulu okufya.
- [ ] Otashi pula ovanafaalama nepangelo oshimaliwa shihapu oku u kondolola.
- [ ] Ovanafaalama itava dulu oku mona mo oilikolomwa yoimuna ei ta i vele.
- [ ] Kandi na eshiivo musho nawa.
- [ ] Kandi na eshivo musho nande nande.
- [ ] akwao ,a tumbula :

18 Eshi wa tala oshike tashi dulu oku ningwa oku keelela o *Peste des petits ruminants mo* Namibia?*

- [ ] Okutembula oimuna nomukanda. (eembapila)
- [ ] Oku mona omauyelele kombinga yomukifi ou
- [ ] Oku mona omauyelele kombinga yomukifi ou.
- [ ] Oku likalekela oimuna opo ya landwa monhele imwe.
- [ ] Okulikalekela oimuna ei tai vele monhele imwe.
- [ ] Oku hakula oimuna sha ukila komalombwelo a ndokotola woimuna.
- [ ] Oku kondolola omalinyengo oimuna noilikolomwa yoimunana peengaba.
- [ ] Ekeelelo lelumbakanifo loimuna yoye naaimwe yi li li.
- [ ] Akwao, a tumbula :

Attitude Assessments

19 Omolwashike ho faalama oimuna ngaashi oikombo needi?*

- [ ] Osha fimanekwa
- [ ] Omufyuululwakalo wetu
- [ ] Oku mona mo oyuuye mo.
- [ ] Kandi na eshiivo musho nande nande.
- [ ] Oku mona mo oilikolomwa ngaashi (omashini, ombelela, oshipa)
- [ ] Imwe po,i tumbula :

20 Onga omuNamibia, osha fimana oku kotokela omikifi doikombo needi dokondje yoshilongo?*

- [ ] Heeno
- [ ] Ahowe
- [ ] Kandi na eshiivo musho nawa.

21 Omalinyengo oikombo needi pokati kaNamibia na Angola otaa dulu oku tandavelifa omikifi doikombo needi?*

- [ ] Heeno
- [ ] Ahowe
- [ ] Kandi na eshiivo musho nawa.

22 ? Ove onga omunafaalama woimuna,kombinga yomalinyengo oinamwenyo,oto diladila ngahelipi kombinga yeengaba da Namibia na Angola di kale dina eendjidikila da kola neenghono?

0 1 2 3 4 5 6 7 8 9 10

Ita ndi tu kumwe nasho nande nande. Oha ndi tu kumwe nasho filu filu

23 Osha fimana oku kwashilipaleka alushe ilo omafimbo mahapu oku kufa omafaneko eehonde deedi noikombo i ka konaakonwe shi na sha nomikifi ngaashi o *Peste des petits ruminants?*

0 1 2 3 4 5 6 7 8 9 10

Ita ndi tu kumwe nasho nande nande — Oha ndi tu kumwe nasho filu filu.

24 Pamadilaadilo oye, oto dilaadila omalinyengo eedi noikombo kudja ponhele imwe ya yuka konhele ikwao moitopolwa-mukunda yanooli i kale ta i kondololwa?

- ☐ Heeno
- ☐ Ahowe
- ☐ Kandi na eshiivo musho nawa.
- ☐ Ka ndi na eshiivo musho nande nande.

25 Pamadilaadilo oye, o to dilaadila mbela shi li sha fimana oku kala kwa longekidwa eenhele da lalakanenwa oku kala oimuna oyo opo ta i mo lwotete mofaalama yeedi noikombo?

- ☐ Heeno
- ☐ Ahowe
- ☐ Kandi na eshiivo musho nawa.
- ☐ Kandi na eshiivo musho nande nande

26 Osha fimana oku kala mu na eenhele da nuninwa oimuna oyo tai vele mofaalama ?

- ☐ Heeno
- ☐ Ahowe
- ☐ Kandi na eshiivo musho nawa.
- ☐ Kandi shi shi nande nande.

27 Pamadilaadilo oye,ovanafaalama nava fute oifendela kombelelwa youhaku noundjolowele woimuna?

- ☐ Heeno
- ☐ Ahowe
- ☐ Kandi na eshiivo musho nawa.
- ☐ Kandi na eshiivo musho nande nande.

28 Moku tala ,o to dilaadila shi li sha fimana okuvenda eedi noikombo otunhila opo ku keleelwe oimuna oyo komikifi?

☐ Heeno	☐ Ahowe
☐ Kandi na eshiivo musho nawa.	☐ Kandi na eshiivo musho nande nande.

29 Mokudilaadila, ou wete sha fimana alushe oku mona ombapila yepitikilo okulinyengifa eedi noikombo konhele imwe?

☐ Heeno	☐ Ahowe
☐ Kandi na eshiivo musho nawa.	☐ Kandi na eshiivo musho nande nande.

30 Osha fimana oku tanda oimuna ngaashi oikombo needi ku kwashilipalekwe kutya oya fya koshike?

☐ Heeno	☐ Ahowe
☐ Kandi na eshiivo musho nawa.	☐ Kandi na eshiivo musho nande nande.

Practices Assessments

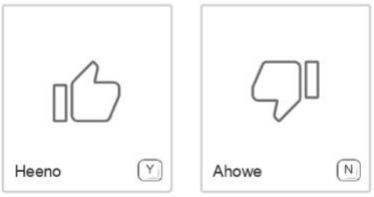
31 Openi pe na onhele yOulifilo woimuna yoye ngaashi eedi noikombo?

- [ ] okudingilila oshitopolwa shetu
- [ ] Omoitukulwa-mikunda imwe po (NCA.)
- [ ] omoAngola
- [ ] Imwe vali ,I tumbula:

32 ?* Oikando ingapi ho tale ilo okukonakona eedi doye noikombo?

- [ ] Alushe
- [ ] Oluhapu
- [ ] Omafimbo amwe po.
- [ ] omalufe
- [ ] nande nande

33 Ou na po oidjalomwa yanuninwa okulongifa mokukwata nokukwafela oimuna ta i vele ngaashi eedi noikombo?



34 Oho ningi po onghendabala ili pi po ngeenge eedi noikombo yoye ta i vele?*

- [ ] Nghi na eshi handi ningi po.
- [ ] Oha ndi i dipaa ile ndi i tome po.
- [ ] Ohandi dengele omundokotola, omunamuti womoshitopolwa opo ndi ka tale ko omiti doimuna.
- [ ] Ohandi i hakula nomiti dopamufyuuluwakalo.
- [ ] Ohandi dengele ookaume,ookahewa ie ovanashilonga pamwe naame va kwafele nge omayele avo.
- [ ] Oha ndi dengele kombelewa yepangelo youhaku woimuna oyo i li popepi naame.
- [ ] Oha ndi dengele ile ndi I twale pombelelwa yopaumwene youhaku woimuna.
- [ ] dimwe vali,di tumbula:

35 Pomhito ei to ka pumbwa ouhaku woimuna yoye,oto ka dula tuu oku kwatafana nombelewa ina sha nouhaku noundjolowele woimuna?

- [ ] Heeno
- [ ] Ahowe, ka puna ekwatafano la sha.
- [ ] Ahowe, omakufikufi ekwatafano okwa hepa monhele omu ndi li.
- [ ] Ahowe, ope na eepate dii doku kufa oimuna ponhele imwe ndi i twale ponhele ikwao.
- [ ] Ahowe, Kandi na otuwa ta i dulu oku umbata oimuna ilo oshimaliwa shoku hiila otuwa i dule ku umbata oimuna yange .
- [ ] amwe vali,a tumbula:

36 Oho ningi po onghendabaala ya shike opo u kelele oimuna yoye ngaaashi eedi noikombo ya ha vele?

- [ ] VOtunhila yoimuna
- [ ] Okuxwepopaleka oipuka moimuna.
- [ ] Okukondolola eenghupa moimuna
- [ ] Prophylactic antibiotic treatment
- [ ] Oku yandja oikwa noipangifo youndjolowele koimuna.

☐ Amwe vali,a tumbula:

37 Oho lande peni oimuna yoye ngaashi eedi noikombo?

- [ ] Okudingilila oshitopolwa shetu.
- [ ] omoitopolwa imwe po.
- [ ] Ouninginino woVCF
- [ ] okoAngola
- [ ] Oko South Africa
- [ ] imwe po,i tumbula:

38 Oho tula oimuna yoye ei opo wa lande ngaashi eedi noikombo monhele imwe yeli kalekelwa?

- [ ] Ahowe
- [ ] Heeno,oule womafiku omulongo na-anhe.
- [ ] Heeno,oule womafiku omilongo mbali nalimwe.
- [ ] Heeno,oule womafiku omilongo nhatu komutwe.
- [ ] Omalufe
- [ ] Ahowe,ina ndi shi tala k osha fimana.
- [ ] Ahowe,ina ndi i tavela kutya osha fimana.
- [ ] Ahowe, Kandi na omatungo eli meyukililo loku tula oimuna yange oyo opo nda lande.
- [ ] Amwe po,a tumbula:

39 * Olungapi ho landifa po eedi doye noikombo?

- [ ] Always Alushe
- [ ] Usually oikando ihapu
- [ ] Sometimes Omafimbo amwe po.
- [ ] Rarely Omalufe
- [ ] Never nande nande

40 Oimuna yoye oho i landifile peni?

- [ ] Within the region Okudingilila oshitopolwa
- [ ] In other regions of NCA Moitopolwa imwe po yoNCA.
- [ ] South of VCF (via quarantine) kOuninginino wo VCF okudilila monhele yelikalekelwa ya amenwa.
- [ ] Angola omoAngola
- [ ] South Africa omoSouth Africa
- [ ] Other (Please Specify) Imwe po ,i tumbula:

41 Oho talele po Angola,oikando ingapi?

- [ ] Ahowe
- [ ] keshe efiku.
- [ ] few times a week Oikando i nini moshivike.
- [ ] olwoshikando shimwe moshivike.
- [ ] olwoshikando shi he dulife pushimwe momwedi.
- [ ] oikando i nini momwedi.
- [ ] Iumwe ashike momwedi.
- [ ] imwe vali,I tumbula?

42 Oho kala mo efimbo li fike peni moAngola?

- [ ] A howe,iha ndi talele po Angola.
- [ ] omafiku manini.
- [ ] Some weeks Oivike imwe po.
- [ ] eemwedi dimwe po.
- [ ] Eemwedi hamano.
- [ ] oule wodula.
- [ ] shimwe , shi tumbula:

43 Ngeenge to talele po Angola, oho etelele eengobe ilo oimuna i nini ile ombelela ta i landifwa oshoyo oilikolomwa yombelela,olungapi ho shi ningi?

- ☐ Iha ndi talele po Angola nande nande.
- ☐ Ahowe,ashike oha ndi talele po Angola.
- ☐ Heeno, ndele haalushe.
- ☐ Heeno, omafimbo amwe po.
- ☐ Heeno, oikando ihapu.
- ☐ Heeno, efimbo alishe.

44 Ngeenge toka talele ko Angola, Oho etelele oimuna yoye ngaashi eengobe, eedi ilo oikombo yoye?

- ☐ Iha ndi talele po Angola.
- ☐ Ahowe
- ☐ Oimuna oyo ha ndi twaalele koANgola.
- ☐ Heeno, Oimuna yange oyo opo nda lande moAngola.

45 Eengobe, eedi noikombo wa kufa moAngola oho i longifa ngahelipi?

- ☐ Oha ndi xwepopaleke oyuunda yange.
- ☐ Oha ndi i tomo po molwa oivilo yeehango ilo peenghali domomudingonoko.
- ☐ Oha ndi i dipaa ile ndi i tome po moitopolwa yomomudingonoko.
- ☐ Iha ndi lande oimuna moAngola.
- ☐ amwe po,a tumbula:

46 Oimuna yoye ngaashi eedi noikombo oha i tonatelwa komunambelewa womuhakuli woimuna a deuka nawa ngeenge wa di mo nayo moAngola?

- ☐ Ahowe, eedi noikombo yange ihai i mo moAngola.
- ☐ Heeno
- ☐ Haalushe.
- ☐ Omafimbo amwe po.
- ☐ Omalufe.
- ☐ Nande nande

Appendix 6: Permissions for conducting research activities in the Omusati and Ohang wena Regions of Namibia.

REPUBLIC OF NAMIBIA

OMUSATI REGIONAL COUNCIL

OFFICE OF THE CHIEF REGIONAL OFFICER

Tel: +264 65 251019
Fax: +264 65 251078 / 088639090
E-mail: info@omusatirc.gov.na
Website: www.omusatirc.gov.na
Our Ref: 10/2/2/5
Enquiry: Ms Irene N Andjengo

Erf 1080 Namaungu Street
Private Bag 523
OUTAPI

27 June 2023

Dr Brighton Gorejena
P.O. Box 143
OGONGO

Dear Dr Gorejena

PERMISSION TO CONDUCT KAP SURVEY IN THE OMUSATI REGION

1. The Regional Council acknowledge receipt of your Letter, dated 27 June 2023, regarding the above-mentioned subject.

2. Thus, it is pleasing to inform you that your request has been submitted to the respective Regional Councillors.

3. Follow-ups could be made with the respective Constituency Offices as follows:

Constituency	Contact Number	emails
Ruacana	065 272133	ruacanaconst@gmail.com
Onesi	065 258716	onesiconst@gmail.com
Outapi	065 251511	outapiconst@gmail.com
Anamulenge	065 250426	anamulengeconst@gmail.com
Okalongo	065 253544	okalongoconst@gmail.com
Etayi	065 254638	etayiconst@gmail.com

4. We hope you will find all in order and wishing you all the best in your study.

Sincerely,

OMUSATI REGIONAL COUNCIL Private Bag 523 Outapi 2023 06 27 Fax: 065-251078

Gervasius Kashindi
CHIEF REGIONAL OFFICER

cc: Regional Councillors: Ruacana, Onesi, Outapi, Anamulenge, Okalongo and Etayi constituencies

All official correspondence must be addressed to the Chief Regional Officer

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Veterinary Science

RECEIVED IN REGISTRY
BY: J TA
27 JUN 2023
TIME: 08:00
OMUSATI REGIONAL COUNCIL

Tel: +264-652235212
Fax: 088632794
Email: bgorejena@unam.na
Enquiries: Brighton Gorejena: 0814618869

P. O. Box 143
OGONGO
Namibia

27th of June 2023

TO: Mr. Gervasius Kashindi, the CRO of the Omusati Regional Council

CC: Hon. Andreas Shintama, Regional Councillor of Raucana Constituency
Hon. Festus Petrus, Regional Councillor of Onesi Constituency
Hon. Immanuel Shikongo, Regional Councillor of Outapi Constituency
Hon. Tylves Angala, Regional Councillor of Anamulenge Constituency
Hon. Laurentius M. Iipinge, Regional Councillor of Okalongo Constituency
Hon. Hans Haikali, Regional Councillor of Etayi Constituency

RE: PERMISSION TO CONDUCT KAP SURVEY IN THE OMUSATI REGION

The above subject refers.

My name is Dr Brighton Gorejena, a lecturer, at the University of Namibia, based at Ogongo Campus. I kindly seek a written confirmation from your office to conduct a Knowledge, Attitudes, and Practices (KAP) survey in the selected constituencies within your region.

I am currently pursuing a postgraduate study with the University of Pretoria where my focus is on Global One Health. I am in the final year and need to carry out research in partial fulfilment of the degree MSc. Global One Health: Diseases at Human Animal Interface.

My research topic is **"Analysis of the risk of the introduction of *Peste des Petits Ruminants* (PPR) into the Northern Communal Areas of Namibia from Angola: perspectives from Omusati and Ohangwena regions".** In the said research topic, I intend to carry out a KAP survey on the livestock (sheep and goat) farmers residing in the constituencies bordering the Namibia/Angola border within the region. The target constituencies are **Raucana, Onesi, Outapi, Anamulenge, Okalongo and Etayi,** where I need to meet **at least 25 sheep and goat farmers in each constituency**, and collect livestock farming information from them through a questionnaire.

I already have an Ethical Clearance Certificate (see attached) and I intend to conduct data collection from **3rd of July to 21st July 2023**, starting with **Raucana Constituency on the 5th of July 2023 at 09h00**, and sequentially following each constituency until Etayi constituency. A day will be dedicated to each constituency, following the agreed time and day confirmations from the respective constituency authorities.

Your kind support will be greatly appreciated.

Yours sincerely

Dr Brighton Gorejena

100 YEARS OF VETERINARY EDUCATION

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Veterinary Science

Tel: +264-652235212
Fax: 088632794
Email: bgorejena@unam.na
Enquiries: Brighton Gorejena: 0814618869

P. O. Box 143
OGONGO
Namibia

27th of June 2023

TO: Mr. Fillipus Shilongo, the CRO of the Ohangwena Regional Council

CC: Hon. Mateus Shikongo, Regional Councillor of Ongenga Constituency
Hon. Erikan Hainghumbi, Regional Councillor of Engela Constituency
Hon. Ester Ndatala Nghidimbwa, Regional Councillor of Oshikango Constituency
Hon. Hilaria Ndjuluwa, Regional Councillor of Ondobe Constituency
Hon. Festus Ikanda, Regional Councillor of Omundaungilo Constituency
Hon. Lebbius Efraim, Regional Councillor of Okongo Constituency

RE: PERMISSION TO CONDUCT KAP SURVEY IN THE OHANGWENA REGION

The above subject refers.

My name is Dr Brighton Gorejena, a lecturer, at the University of Namibia, based at Ogongo Campus. I kindly seek written confirmation from your office to conduct a Knowledge, Attitudes, and Practices (KAP) survey in the selected constituencies within your region.

I am currently pursuing a postgraduate study with the University of Pretoria, focusing on Global One Health. I am in my final year and need to conduct research in partial fulfillment of the MSc degree. Global One Health: Diseases at Human-Animal Interface.

My research topic is **"Analysis of the risk of the introduction of *Peste des Petits Ruminants* (PPR) into the Northern Communal Areas of Namibia from Angola: perspectives from Omusati and Ohangwena regions".** In the said research topic, I intend to carry out a KAP survey on the livestock (sheep and goat) farmers residing in the constituencies bordering the Namibia/Angola border within the region. The target constituencies are **Ongenga, Engela, Oshikango, Ondobe, Omundaungilo, and Okongo,** where I need to meet **at least 25 sheep and goat farmers in each constituency** and collect livestock farming information from them through a questionnaire.

I already have an Ethical Clearance Certificate (see attached) and I intend to conduct data collection from the **11th of July to the 23rd of July 2023**, starting with **Ongenga Constituency on the 11th of July 2023 at 09h00**, and sequentially following each constituency until Okongo constituency. A day will be dedicated to each constituency, following the agreed time and day confirmations from the respective constituency authorities.

Your kind support will be greatly appreciated.

Yours sincerely

Dr Brighton Gorejena

REPUBLIC OF NAMIBIA

OHANGWENA REGIONAL COUNCIL

Tel: 264-65-264355
Fax: 264-65-263033

108 Church Street
Private Bag 88011
EENHANA, Namibia

Enquiries: Onesmus Shapopi
Email: oshapopi@ohangwenarc.gov.na

4 July 2023

Dr. Brighton Gorejena
University of Pretoria
Faculty of Veterinary Science
Tel: 065 2235212

PERMISSION TO CONDUCT KAP SURVEY IN THE OHANGWENA REGION

Reference is made to your letter on the above-mentioned subject dated 27 June 2023.

Ohangwena Regional Council is conscious that research is one of the main academic functions of any academic institution.

Based on the above, you are hereby informed that approval has been granted for you to conduct research on the "Analysis of the risk of the introduction of Peste des Petits Ruminats (PPR) into the Northern Communal Areas of Namibia from Angola: perspectives from Omusati and Ohangwena Regions".

The Council will highly appreciate if a copy of your research project is made available to this office and wish you a fruitful endeavor while carrying out this important task.

Yours faithfully,

Fillipus H Shilongo
Chief Regional Officer

OHANGWENA REGIONAL COUNCIL
Office of the
Chief Regional Officer
2023 -07- 07
Private Bag 88011 Eenhana Namibia
Tel: 065-246306 Fax: 065-264322
REPUBLIC OF NAMIBIA

Appendix 7: The farmer's questionnaire with the key that was used to code the data.

Biographical Details

1 Region & Constituency * a=Omusati region b=Ohangwena region
Constituencies from each region are numbered 1-6.

1	Omusati, Raucana	2	Omusati, Onesi
3	Omusati, Outapi	4	Omusati, Anamulenge
5	Omusati, Okalongo	6	Omusati, Etayi
1	Ohangwena, Ongenga	2	Ohangwena, Engela
3	Ohangwena, Oshikango	4	Ohangwena, Ondobe
5	Ohangwena, Omundaungilo	6	Ohangwena, Okongo

2 What is your gender? *

1	Male	2	Female
3	Prefer not to say		

3 Which of the following best describes your age group? *

1	18-24	2	25-34
3	35-44	4	45-54
5	55-64	6	65-74
7	75 or older		

4 What is the highest education level you completed? *

1	Did not attend school	2	Primary school
3	Secondary school	4	High school
5	College/University Diploma	6	College/University degree
7	Other (Please Specify)		

5 What is your capacity/role? *

1	Full time farmer	2	Part time farmer
3	Livestock keeper	4	Authorised person
5	Other (Please Specify)		

6 What is your farming system? *

1	Communal	2	Commercial
3	Emerging commercial	4	Agro-Pastoral
5	Other (Please Specify)		

7 Do you keep small stock? *

1	No	2	Yes, goats only
3	Yes, sheep only	4	Yes, sheep and goats

8 Do you keep cattle? *

1  Yes Y

2  No N

9 What is your herd size and predominant breeds? *

9a. Indication of the herd sizes 9b. categorized as goats, sheep, and cattle

Knowledge Assessments

10 Where do you get information about important diseases of sheep and goats?* Since there are potentially more possible options, selected response (s) is marked 1 whilst unselected ones are marked 2.

a	Local state veterinary office (Vet/AHT)	b	Private veterinarian
c	Internet	d	Newspaper/Agricultural bulletins
e	TV	f	Agricultural Extension Office
g	Social Media		
h	Other (Please Specify)		

11 How do you tell if your sheep and goats are sick? * Since there are potentially more possible options, selected response(s) is marked 1 whilst unselected ones are marked 2.

a	They stop to eat and drink	b	They just lie down
c	They look weak and depressed	d	They have discharges from the nose, mouth, anus etc
e	They have diarrhoea	f	They have an elevated body temperature (fever)
g	Other (Please Specify)		

12 Can the movement of sheep and goats from one place to another transmit livestock diseases?*

1	Yes	2	No
3	I am not sure	4	I do not know

13 Why do you think newly purchased sheep and goats are quarantined before mixing with others?*

1 To make sure that they are not incubating a disease
2 It is not necessary
3 I do not know
4 Other (Please Specify)

14 Have you heard about a disease called *Peste des petits ruminants* (PPR)?*

1 Yes
2 No
3 I am not sure

15 Do you think *Peste des petitis ruminants* is present in Namibia? *

1 Yes
2 No
3 I am not sure
4 I do not know

16 Do you know of any clinical signs of *Peste des petits ruminants*? *

1  Yes Y
2  No N

17 What do you think are the problems posed by an outbreak of Peste des petits ruminants in Namibia?*

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

a	Farmers will not be able to sell sheep and goats	b	Sheep and goats may die
c	It may cost the farmer and government money to control it	d	Farmers may not get meat, milk and hides from the sick small stock
e	I am not sure	f	I do not know
g	Other (Please Specify)		

18 What do you think can be done to prevent *Peste des petits ruminants* in Namibia?*

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

a	Move sheep and goats with movement permits	b	Getting more information about the disease (creating an awareness)
c	Getting more information about the disease (creating an awareness)	d	Quarantine newly purchased animals
e	Isolate sick animals	f	Treat animals only as advised by the veterinarian
g	Avoid mixing your animals with strange animals	h	Controlling movement of animals and products at the border points
	Other (Please Specify)		

Attitude Assessments

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

19 Why do you farm with sheep and goats?*

a	It is prestigious	b	It is part of my culture
c	To make an income out of farming	d	I do not know
e	To get products like milk, meat and hides when I need them		
f	Other (Please Specify)		

20 Are diseases of sheep and goats in another country important for Namibia to think about?*

1	Yes	2	No
3	Not sure		

21 Do you think the movement of sheep and goats between Namibia and Angola can increase the chances of transmission of sheep and goats diseases?*

1	Yes	2	No
3	I am not sure		

22 Do you think livestock movement at the Namibia/Angola border, should be strictly controlled?

0 1 2 3 4 5 6 7 8 9 10

Strongly disagree — Strongly agree

The scale was converted into a 5-point scale as follows:
0-2=1 (strongly disagree)
3-4=2 (disagree)
5-6=3 (neither agree nor disagree)
7-8=4 (agree)
9-10=5 (strongly agree)

23 Is it important to routinely collect blood samples from sheep and goats to screen for diseases such as *Peste des petits ruminants*?

0 1 2 3 4 5 6 7 8 9 10

Strongly disagree

The scale was converted into a 5-point scale as follows:
0-2=1 (strongly disagree)
3-4=2 (disagree)
5-6=3 (neither agree nor disagree)
7-8=4 (agree)
9-10=5 (strongly agree)

Strongly agree

24 Do you think the movement of sheep and goats from one place to another in the Northern Communal Areas (NCA) should be controlled?*

1	Yes	2	No
3	Not sure	4	I do not know

25 Do you think it is important to have facilities to isolate newly received sheep and goats?*

1	Yes	2	No
3	Not sure	4	I do not know

26 Is it necessary to have a sick bay or separate place to keep sick animals?*

1	Yes	2	No
3	Not sure	4	I do not know

27 Do you think farmers should pay for veterinary services?*

1	Yes	2	No
3	Not sure	4	I do not know

28 Do you think it is important vaccinate sheep and goats to prevent them from getting diseases?*

1 Yes	2 No
3 Not sure	4 I do not know

29 Do you think it is always necessary to first obtain a movement permit before moving sheep and goats?*

1 Yes	2 No
3 Not sure	4 I do not know

30 Is it important for a post-mortem to be carried out on goats and sheep that died of an unknown cause?*

1 Yes	2 No
3 Not sure	4 I do not know

Practices Assessments

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

31 Where do you graze your sheep and goats?*

- a Within the region
- b In other NCA regions
- c In Angola
- d Other (Please Specify)

32 How often do you see or examine your sheep and goats?*

- 1 Always
- 2 Usually
- 3 Sometimes
- 4 Rarely
- 5 Never

33 Do you have some basic protective clothing (overalls, boots, gloves etc) to use in handling sick sheep and goats?*

- 1  Yes (Y)
- 2  No (N)

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

34 What do you do when your sheep and goats is sick?*

a	Do nothing	b	Salvage slaughter
c	Treat with traditional medicines	d	Call or visit some local pharmacist and get some medicines
e	Call some friends or colleagues and get advice	f	Call or take to the nearest state veterinary office
g	Call or take to the nearest private veterinarian		
h	Other (Please Specify)		

35 Should you need veterinary assistance, are you able to reach them?*

1	Yes	2	No, They are not available
3	No, There is a poor network in my area	4	No, there are bad roads to transport the animals
5	No, I do not have suitable transport or provision to hire one		
6	Other (Please Specify)		

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

36 How do you prevent your sheep and goats from getting sick?*

a	Vaccination	b	Deworming
c	Tick control	d	Prophylactic antibiotic treatment
e	Proper feeding and mineral supplementation		
f	Other (Please Specify)		

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

37 Where do you purchase sheep and goats?*

a	Within region	b	Other regions
c	South of VCF	d	Angola
e	South Africa		
f	Other (Please Specify)		

38 Do you isolate newly acquired sheep and goats?*

1	No	2	Yes, for 14 days
3	Yes, for 21 days	4	Yes, for 30 days
5	Sometimes	6	No, i do not know if it is necessary
7	No, I do not believe it is necessary	8	No, I do not have proper infrastructure to do so
9	Other (Please Specify)		

39 How often do you sell sheep and goats? *

1	Always	2	Usually
3	Sometimes	4	Rarely
5	Never		

40 Where do you sell your sheep and goats?*

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

a	Within the region	b	In other regions of NCA
c	South of VCF (via quarantine)	d	Angola
e	South Africa		
f	Other (Please Specify)		

41 Do you visit Angola? How often?*

1	No	2	Everyday
3	A few times a week	4	About once a week
5	A few times a month	6	Less than once a month
7	Once a month		
8	Other (Please Specify)		

42 How long do you stay in Angola if you visit?*

1	No, I do not visit Angola	2	Few days
3	Some weeks	4	Some months
5	Six months	6	A year
7	Other (Please Specify)		

43 When you visit Angola, do you bring along cattle or small stock meat and meat products and how frequently?*

1	No, I do not visit Angola	2	No, but I visit Angola
3	Yes, but seldom	4	Yes, sometimes
5	Yes, often	6	Yes, always

44 When you visit Angola, do you bring along cattle, sheep or goats?*

1	I do not visit Angola	2	No
3	The same ones I would have taken to Angola	4	Yes, the newly purchased ones from Angola

Since there are potentially more possible options, selected response(s) are 1 whilst unselected ones are marked 2

45 What do you do with the cattle, sheep or goats obtained from Angola?*

a	Improve the herd	b	Local slaughter for a wedding or funeral
c	Slaughter for local communities	d	I do not buy from Angola
e	Other (Please Specify)		

46 Are your sheep and goats inspected by a qualified veterinary official upon return from Angola?*

1	No, my sheep and goats do not go into Angola	2	Yes
3	Seldom	4	Sometimes
5	Rarely	6	Never