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Exploration of veterinary service supply to rural farmers in Namibia: a one health perspective

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Abstract

Introduction: *expansion of the Namibian beef export market presents benefits for both the National economy and small-scale farming communities. However, meeting animal health and productivity requirements whilst securing veterinary public health are identified as key challenges to the sector. Farmer access to veterinary services, animal health advice and veterinary medicines is scarce due to the geographical expanse, and on-going risks from endemic and emergent zoonotic diseases.* ***Methods:*** *an exploratory, qualitative research methodology was adopted to obtain ground-up rich*

data from pastoral livestock farmers (n=60) through a series of ten focus groups. Groups were stratified by the geographical regions of Otjozondjupa and Omaheke, representing key beef cattle producing areas in Namibia. Transcribed data were analysed using theoretical thematic analysis, constructed in Grounded Theory methodology, with an iterative constant comparison technique used to identify common themes. Triangulation analysis was completed between authors to ensure consistency in coding. ***Results:*** *focus group data analysis revealed three emergent themes representative of farmer experiences, belief and opinions. Themes relevant and important to pastoralist farming in the regions, and to veterinary public health, were defined and described as; access to veterinary services and advice; veterinary medicines supply chain; farmer knowledge and understanding.* ***Conclusion:*** *control of endemic zoonoses and the prevention of emergent zoonotic disease is essential to secure livestock health, welfare and productivity, and human health and livelihoods in the region. Contemporaneously is the need to improve livestock farmer access to veterinary and public health advice and education, which should be derived through a One Health approach.*

Introduction

Namibia is a vast country, sharing borders with Angola, Zambia, Botswana and South Africa. Despite the expansive landscape, the nation is sparsely populated with only 2.5 million people [1] yet is culturally diverse [2] and is immersed in livestock farming. With robust home and developing export markets, the nation has considerable reliance on the agricultural sector. Livestock farming is essential to the livelihoods of many rural Africans [3]. Pastoralist systems are prevalent in arid regions where inconsistent rainfall prohibits effective crop production and animal farming systems provide a more dependable source of income [4]. Livestock production is often cited as the backbone of the Namibian economy, with approximately 70% of the population dependent on farm animal production [5,6]. The estimated overall financial value of this sector is N$ 3.4bn, half of which is from beef cattle production alone [7]. Irrespective of the sector importance to the national economy, three decades of a declining GDP contribution from the Namibian agricultural sector has intensified pressure on farm animal production [7]. Recent advances in the Namibian beef export market [8] grants benefits for the small-scale farming community, but meeting animal health and productivity requirements, whilst securing veterinary public health are identified as key challenges to the sector [7]. Commercial and subsistence farming systems now run parallel to one another, only separated geographically by the Namibian Veterinary Cordon Fence (VCF) [9]. Balancing livelihood demands and export market requirements is difficult to achieve. Urbanisation, and the fast growing demand for dairy and meat in city regions of resource limited countries has instigated intensification of livestock production systems [10] in areas which may not yet be suitably equipped.

Low farm animal productivity has long been attributed to both weak production systems and poor animal health in Namibia [11,12]. The critical risks to the livestock farming sector have been acknowledged as follows: failing animal health status; non-compliance of infrastructure; lack of preventative support and advice on matters of animal health, and the subsequent decline in livestock production efficiency [12]. Risk factors are compounded as pastoralist farming communities are typically poor and have limited access to animal health resources including education and medicines [13,14]. Poverty among sub-Saharan African subsistence farmers is a continual challenge to the livelihoods of those in rural communities. Globally, millions of lives are affected by zoonotic disease with the greatest impact is within developing countries [14,15,16]. Modelling of worldwide disease outbreaks estimates that around 76% of emergent human disease is zoonotic in origin [17] creating a significant risk to human health. Endemic zoonoses have a devastating effect

on human health and livelihoods, and animal health, welfare and production. Rural communities in developing countries are the most vulnerable to zoonotic disease due to the close residence with animals and dependence on livestock farming practice; traditional food consumption practices, and limited access to human and animal health services [17,18]. Many endemic zoonoses present in both humans and livestock with non-specific clinical signs, which can lead to under-reporting. Limitations in health service provider awareness, mis-communication, and the misdiagnosis of zoonotic disease is concerning [18]. Where zoonoses are poorly recognised by health care providers, this pattern of under-recognition persists [18,19], such is the case with febrile illnesses of zoonotic origin [19]. Limited access to education and training communication, due to concomitant restrictions in animal and veterinary health service providers in developing regions is thought to perpetuate the zoonotic disease challenge. Table 1 highlights the extent of the current zoonotic disease risk from domesticated livestock in Namibia [11,20,21].

Irrespective of the recognised socio-economic impact of livestock farming to Namibia, and the significance to sustained human health, poor animal health provision and infrastructure is evidenced through the scarcity of veterinary services [6,22,23] across the geographical expanse. In Kenya, the challenges farmers face in accessing reliable veterinary and animal health services is a direct impediment to livestock production and livelihoods [23,24]. Insufficiencies in the availability of education and advice to farmers is associated with poor access to veterinarians [12]. Additionally, it is documented that limitations to animal health services increases risk of zoonotic transfer of disease [18]. Farmer access to education and advice from trained professionals, and access to legitimate veterinary medicinal products (VMPs) through an established supply infrastructure are both essential components of effective animal health services, and are of fundamental importance to farmer education and their decision-making [25,26]. Informed and educated farmers are better positioned to perceive disease risk in livestock, the consequence of which could be enhanced food security and improved veterinary public health. Outreach, farmer education and communication are recognised as key strategies for enhancing farmer awareness of livestock production techniques, responsible use of VMPs and the potential impact of drug residues on human and environmental health [27]. There are concerning limitations in secure VMP dispensing, including antibiotics, and the provision of animal health services across many African countries [28-32]. Reported inadequacies are reflective of the Namibian livestock production sectors [6,11,25], but this is yet to be reported through ground-up inquiry. In developing regions, veterinary public health is focal to the public health remit [33,34]. Disease risk through zoonotic transfer such as hydatidosis, cysticercosis, and tuberculosis [11,25] are only a few examples of the current wider public health risks through contact with livestock. The proposition that the pharmacist may make a valuable contribution to veterinary public health provision is raised within this study. Worldwide, Pharmacists are considered to be accessible health care providers, and are important members of the health care team [35]. Pharmacy is the single health care profession able to bridge both human and veterinary medicine, thereby having the potential to be an interlocking practitioner in One Health. The approach to livestock farming practice in Namibia from the perspective of ground level rural farmers was the core focus of this project. Examination of farmer experience and opinions on the available veterinary and animal services; appraisal of farmer knowledge and understanding of endemic zoonotic disease risk were fulfilled through the core project aim, defined as: to evaluate animal health service provision and the veterinary public health infrastructure in Namibia. Consequently, the study sought to generate discussion on the role of One Health based veterinary pharmacy practice as a professional service capable of supporting rural livestock farmers.

Methods

This study employed qualitative research methods to explore pastoralist farmers´ perspective on animal health services, veterinary medicine use and availability, and topics of veterinary public health. A qualitative methodology was selected as a recognised technique to explore and understand complex issues of attitudes, opinions, experiences, and behaviours [36] of rural farmers. Thematic analysis permitted a highly flexible approach, capable of yielding rich and detailed data [37]. Ten focus groups, administered by the primary researcher (VMH), were completed with Namibian pastoralist farmers (n=60). Groups were stratified by geographical area, namely the Otjozondjupa and Omaheke Regions, representing the main beef cattle producing areas in Namibia. Identification and selection of focus group participants using homogeneous purposive sampling was essential to ensure a well-informed and germane contribution [38]. Study participants were predominantly male, and within the age bracket of 46-60 years. Participants were representative of pastoralist farmer demographic of the region [25]. The study proposal was approved by Harper Adams University Research Ethics Committee (UK) and risk assessed for compliance with the Nagoya protocol. Between February and April 2019, the focus groups were completed at two cattle markets (Okakarara and Otjinene markets). Prior to each focus group, participants gave verbal and audio recorded consent. Written consent was not sought for cultural sensitivity reasons. Audio-files, accompanying field notes and transcribed files were fully anonymised and held in-accordance with UK data protection regulations (GDPR). Techniques to standardise interview behaviour are beneficial to the process and validity, accordingly an interview sheet was devised (Annex1). Focus group duration was between approximately 45 to 75 minutes. To facilitate data collection and encourage un-restrained data collection, focus group discussions were conducted in the Otjiherero language, the prevailing language of both regions. Focus group audio recordings were subject to concurrent transcription and translation from Otjiherero language into English by the primary researcher (VMH). Theoretical thematic analysis, constructed in Grounded Theory methodology, with an iterative constant comparison technique used to identify common themes and patterns within the transcribed focus group dataset [39]. Data saturation was reached when no new theoretical codes emerged [40]. A systematic approach to coding the data was adopted [41], and triangulation analysis was completed by the second author for verification (AZP).

Results

Focus group discussion disclosed three key themes. The categorisation of emergent themes are presented below in the Thematic Flow Map (Figure 1) and accompanying narrative.

Theme one: access to services and advice: access to veterinary and animal health services were important to the farmers and correspondingly discussions were delineated by how and where they obtain services and the limitations they experienced. Farmers responded to questions on the advice they received on topics of human and environmental health.

Where do farmer get services and advice: on occasions, farmers were able to obtain their veterinary medicines from larger agricultural retail outlets and cooperatives, such as Kaap Agri, or Agra Coop, but many frequented smaller merchants which were closer to home. Access to veterinarians was perceived to be difficult, due to availability and geographical constraints. When asked about the opportunity to have veterinary consultations or to ask questions of a veterinarian, one farmer commented *No, we do not* (do) *that* (consult with veterinarians), *because of the distance, they are too far away from where we are.... and the State Vet officials do not pay us occasional visits. Again, because we are too far away.* Other rural based farmers who were located further out of town, were only served by small medicines outlets. For

these farmers, issues around product availability, access to services, and advice on products ware scarce or non-existent. When asked if they could consult veterinary drugs suppliers for additional advice and information, the responses were clear. *No not really, information on the* (veterinary) *drugs is not offered to us from the small outlets. The small outlets are nearest, but they do not provide any additional information. No that is not available to us, we cannot access the suppliers to ask further questions about the drugs. We go with what we already know.* Farmers were advised to use information on the product leaflet or datasheet, no further information was communicated. *We really do not get information on the* (veterinary) *drugs from them. We just read from bottles.* Additional advice on drug withdrawal time was not provided or available. For withdrawal periods a standard seven day period appeared to be broadly followed regardless of the medication, production stage or age. *We normally just read on the* (from the) *bottles. We stick to that date from the back, then we know for seven days you must not consume meat or milk.* Animal health technicians (AHT) were discussed as good source of information, but accessibility due to geographical distance was problematic. *Yes all* (of) *the problems we are experiencing we go to animal health technicians. They are very useful. But they take* (too) *long to get to you. It is difficult to get to see a veterinarian.*

Advice on safeguarding human health: farmers were not informed on how to protect themselves when handling and administering veterinary medicines. *We are not told about how to use the drugs safely. All we know is what the drug is for, for Black quarter or Brucellosis....*They had experience of injury associated with the administration of veterinary medicines, but knowledge and awareness was experiential and anecdotal rather than readily available. It is difficult to know what was self-administered, as confusion between different types and groups of medicines was apparent. This was further confirmed by Theme Three. *One farmer once accidentally injected himself with an anti-biotic on the thumb and it developed into a big wound. It seemed to be ok, I think.* On discussing the use of organophosphate based products (Diazinon), limited advice on wearing Personal Protective Equipment (PPE) had been given. *We use Dazzle...I don't wear anything different, or any protective clothing. I don't think I need to*.

Advice on safeguarding environmental health: on topics of veterinary medicine disposal, expired medicines or empty drug containers, at best advice was weakly communicated and at worst no advice was provided. Some provision to safeguard environmental health was made through the system adopted by farmers to return vaccine bottles post use. Farmers did confirm that they retained and returned empty bottles to their local veterinarian, or Agricultural Officer for recording purposes. Farmers were aware that return is required by the Directorate of Veterinary Services. *We take back the* (vaccine) *bottle to the Agricultural Extension Officer. They record that we have given the treatment to the cows. This is needed by the DVS* (Directorate of Veterinary Services), *they keep track of the treatments and drugs we have given.* However, this return service only includes vaccines for Anthrax, Botulinum, Brucellosis, Lumpy Skin Disease and Black quarter. For all other medicines including antimicrobial or anthelmintic products, used bottles, expired medicine, disposal was in the local environment in the general waste. *We just throw them away. There is nowhere special for them to go. But we keep a record of when you last vaccinated a particular animal. That is important.* But no information on drug disposal, empty containers, left-over or expired medicines was provided to the farmers, nor was a service offered. *We are not informed as to how to dispose of the empty medication bottles. No one will collect them or take them away.*

Theme two: supply chain: supply of legitimate veterinary medicines, whilst not-focal to the study aims, emerged as a critical theme. Access to a range of VMPs and in appropriately sized volumes were the key factors of importance to farmers. **Drug choice and availability:** farmers from the more

remote areas indicated challenges encountered when seeking to obtain correct medicines; this was due to supply chain restrictions. Farmers were also unable to purchase smaller pack sizes, and were forced to opt for larger volumes or not at all. Untrained outlet staff, were unable to break bulk safely. Affordability was an ever present issue. *I would prefer smaller packages because not all the* (sic) *people can afford drugs in larger packages. Only well off farmers can afford larger pack sizes.* Farmers were restricted to what medication was available for them to use, with reported issues of stocking and inadequate supply. When asked about medicine availability, one farmer responded. Medications are *not always available, some medications are in demand so they always run out of stock for example the LSD* (Lumpy Skin Disease) *vaccine. We all need that one. But they are always running out of it.*

Theme three: farmers´ knowledge and understanding: in the absence of robust veterinary service provision, experiential and tacit knowledge were key to farmers´ understanding of VMPs and livestock diseases.

Farmers´ knowledge on drugs: through discussions on veterinary medicines and their uses, limitations in farmer knowledge and understanding in this area were evident. Oxytetracycline, classified as Schedule Zero (over the counter), was commonly regarded as the drug for all disease conditions encountered, raising concerns around antibiotic over-use, mis-use and risk of antimicrobial resistance (AMR). The most common brand of Oxytetracycline, Terramycin, is widely used and farmers identify and request it based on its visible packaging

We are used to using Terramycin, and I usually ask for it. It was also found that farmers do not distinguish between a vaccine and an antibiotic and the terminologies are often used interchangeably. *We cannot access information, we share what we know at farmers´ days and so we normally just vaccinate with Terramycin or Streptomycin.* However, farmers in general, had a greater awareness of adverse reactions in animals as respondents could recall incidences of temporary lameness in cattle, the formation of an abscess following vaccination, and swelling at injection site due to doramectin administration. Reporting of adverse drug reactions was not generally practiced with farmers being unaware of the obligation to involve an animal health professional in such cases. *I don't report these to anyone. I don't think that it* (is) *necessary or that we have to report it. Anyway, where would I report to.*

Farmers' knowledge on zoonosis: farmers were asked about zoonotic disease to gauge their awareness of disease transmission from livestock to humans. When asked about the possibility that disease could transfer from animals to humans, there was some confusion. *I am not really sure. But we cook the calves (fallen stock) for the dogs to eat, they seem to be ok.* Brucellosis was brought up for discussion on a number of occasions, and farmers understood Brucellosis as an important production disease affecting their cattle. Farmers also appreciated the economic impact of the disease and the potential impact on their livelihood. *Brucella will cause us to lose money, as it slows their (cattle) growth, and can we can lose calves. We need to vaccine against it.* There was an understanding of the use of a Brucellosis vaccination to enhance animal production to prevent losses but not to reduce the disease risk to humans. *I don't know if it (Brucellosis) can affect people...* Interestingly, farmers did have a high level of awareness of the following notifiable diseases: Anthrax, Rabies and Crimean Haemorrhagic Congo Fever (CCHF). *There are notifiable diseases...I mean those which you need to report. Rabies is a risk. Other ones I* can think of are Anthrax, Rabies and CCHF.

Discussion

In this study, we examined the knowledge, attitudes and experience related to veterinary and animal health services in Namibian pastoral livestock farmers, in a One Health context. Broadly,

the farmer focus group output indicated two key areas to be notable points for improvement; i) readily accessible tangible service provision, and ii) quality of service and communicated information. Interaction with practitioners through accessibility and visibility were critical components. The finding that the Namibian rural livestock farming communities are generally poorly served with regard to comprehensive and quality animal health services echoes the situation in comparable developing African nations such as Kenya [28], Ghana, Tanzania, Zambia, Zimbabwe [42], and South Africa [43]. Critical commentary on VMP supply, the provision of appropriate advice on medicine use, handling, storage and disposal, as well as advice on veterinary public health issues, have been identified in prior studies [28,29,30,42,43]. Though it is suspected that the veterinary and veterinary pharmaceutical sector in Namibia bears some resemblance to other African nations in the challenges faced, there are no comprehensive studies conducted to characterise this. The findings from this study determined that clearly communicated information on animal health and disease, awareness of public health risks to human and environmental health, and VMP usage are central to the current deficiencies in animal health services. The results indicate that routine farmer practice reflects risk factors associated with AMR development such as blanket use of over the counter (OTC) antibiotics, poor medicine disposal, and poor access to farmer training and education.

The study results indicate weaknesses in the VMP distribution channel, and the corresponding availability of communicated advice and guidance. Farmers located near to rural towns were able to access the larger agriculture outlets, but many others pastoralists were less well served. Agricultural outlets are supplied by international companies, as is the case in other African nations [24], with a small number of providers dominating the marketplace. For these distributors and retailers, rational dispensing to mitigate the development of AMR, provision of advice on correct dosing, withdrawal period, storage and disposal of used or expired medicines, and the public health implications of VMP use are areas of concern. The development of AMR is complex and multifaceted; it is the embodiment of the One Health philosophy. Under the Namibian Medicines and Related Substances Control Act, Act No. 13 of 2003, antibiotic classification medicines, Sulfonamides and Oxytetracycline are routinely available OTC, as are all anthelmintic and ectoparasiticide drugs. In regions where antibiotics are OTC, and veterinary guidance may be limited, control of the antibiotic footprint (AF) [32] is difficult to achieve. The OTC supply of VMPs further negates farmer access to advice and guidance at the point of sale. Access to services, through a clear supply chain of veterinary medicines, and farmer education at the point of sale should be the benchmark. Research completed in comparable regions [43], found that State Veterinarians and AHT were often not involved in VMP sale, and rural farmers were required to travel distances to purchase medicines. Other notable areas of challenge were identified as inaccessibility of outlets, poor quality of service and affordability [24,44,45], all are reflected in the Namibian livestock farming community through this study.

With a paucity of veterinarians, Namibian livestock farmers can only access animal advice from a limited supply, and often farmers draw on past experience, tacit knowledge or ethno-veterinary practice [45]. The finding are in-accordance with livestock farming systems in Tanzania, Ghana, Kenya, Zambia and Zimbabwe [42,46]. Often, guidance is obtained from one of the larger Agricultural retail outlets, who may themselves be under pressure to sell VMPs [42] to sustain livelihoods. Training for drug stockists can be variable [46,47] and reliance on VMP data sheets may be inaccessible to farmers due to language, literacy or cultural barriers [43,46] which can be problematic. Preferences of farmers for a specific veterinary product has been reported to drive the development of resistance as the active ingredient

is often disregarded [29,30]. As seen in this study, in the absence of appropriately trained VMP dispensing staff, customer preferences determine dispensing practice, thus compromising rational dispensing. These results are illustrative of earlier studies which correlated training with improved quality of advice and information provided to clients during dispensing of veterinary medicines [29,30].

The veterinary paraprofessionals, AHTs and Community Animal Health Workers are trained in animal health and welfare, and VMP safe usage. Community Animal Health Workers are deeply rooted in the community, and correspondingly are highly trusted by rural farmers [28] aiding the successful communication of advice and guidance. A community-based cadre is well placed to extend veterinary pharmaceutical services to rural communities. Community pharmacists are accessible to rural communities, as a recognised practitioner within the community and are trained in pharmaceutics. In developing countries, extension of pharmacy role into public health is now in-step with the pharmacist remit in developed nations [35]. But the role could be extended to include veterinary public health, ensuring safe supply of veterinary medicines, providing advice on use, storage and disposal, pharmacovigilance, as well as information on zoonoses prevention and control. In this novel work, the study findings raise questions for future research. In summary, these are proposed as: Enquiry into farmer use of veterinary product datasheets; Source of farmer knowledge on livestock zoonotic and notifiable disease; Farmer acceptance of a veterinary pharmacist cadre.

Conclusion

Namibia is presented with significant opportunities in the meat export market, offering the prospect of reinstating a valuable GDP contribution from the livestock sector to the national economy. In direct contrast the continued human and livestock disease challenge from endemic zoonosis remains, with concurrent risks of emergent outbreaks. Deficiencies in veterinary and animal health services prevail, and the results of this study indicate that the challenges faced by the Namibian farmer experience is representative of a wider problem experienced by farming communities in other African nations. The veterinary pharmacy cadre embodies the One Health philosophy, whereby over-lapping and inter-linked human and animal health is secured, and presents a possible solution to a complex problem.

What is known about this topic

- *In developing nations zoonotic disease in livestock present a significant risk to human health and livelihoods, and animal health, welfare and production;*
- *Zoonotic disease and its impact is under-reported due to a lack of training and education in disease recognition and risks.*

What this study adds

- *A ground-up evaluation of the daily challenges faced by livestock farmers;*
- *The risks to human, animal and environmental health persist in the absence of accessible veterinary services and a secure supply chain for veterinary medicines;*
- *Contributions from veterinary paraprofessionals, such as a veterinary pharmacy cadre, are needed to ameliorate deficiencies in veterinarian supply.*

Competing interests

The authors declare no competing interests.

Authors' contributions

All authors have read and agreed to the final manuscript.

Table and figure

Table 1: zoonotic disease present within the Namibian animal population in the period from 2009 to 2019

Figure 1: thematic flow map depicting pastoral livestock farmer experiences of veterinary services, as produced from a thematic analysis of data collected during 10 farmer focus groups conducted in the Otjozondjupa and Omaheke Regions of Namibia between February and April 2019

Annex

Annex1: interviews schedule for farmer focus groups

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Table 1: zoonotic disease present within the Namibian animal population in the period from 2009 to 2019	
Disease	**Species most commonly affected**
Anthrax	All domesticated livestock
Brucellosis	Bovine strain (*Brucella abortus*)
Bovine spongiform encephalopathy (BSE)	Bovine
Crimean Congo haemorrhagic fever (CCHF)	Bovine, ovine, caprine Asymptomatic in livestock
Echinococcosis/hydatidosis	Common in all domesticated livestock. Carnivores act as definitive hosts
Enzootic abortion	Ovine, caprine
Glanders	Equine
Mycobacterium tuberculosis	Bovine
Rabies	All domesticated livestock
Rift Valley Fever	Bovine, ovine, caprine, camelids
Porcine cysticercosis	Porcine
Q fever	Bovine, ovine, caprine
Scrapie	Ovine, caprine
Salmonellosis (*S.enteritidis, S.typhimurium*)	Avian, bovine, porcine
Trypanosomiasis	Common in all domesticated livestock
West Nile Fever	Avian, equine

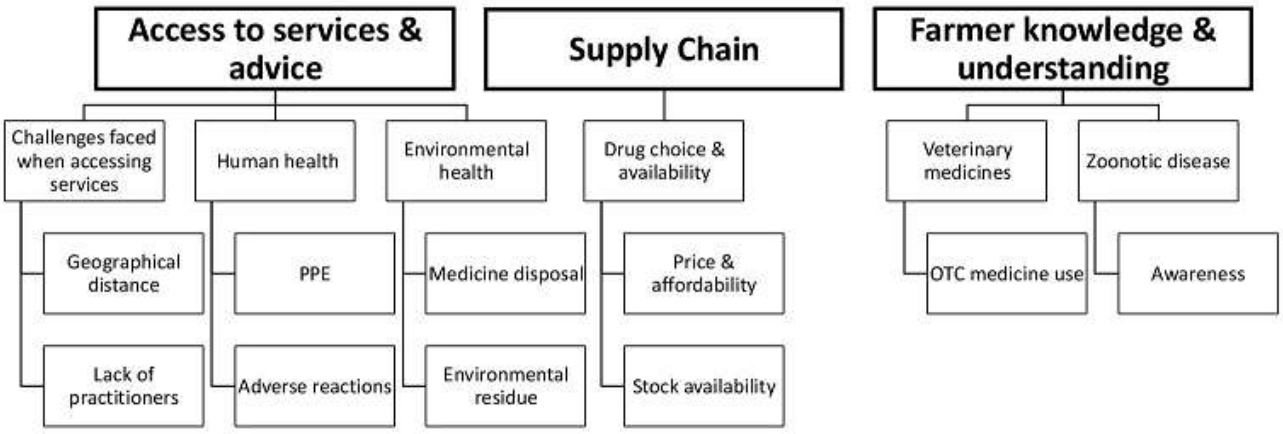

Figure 1: thematic flow map depicting pastoral livestock farmer experiences of veterinary services, as produced from a thematic analysis of data collected during 10 farmer focus groups conducted in the Otjozondjupa and Omaheke Regions of Namibia between February and April 2019

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Annex 1: interviews schedule for farmer focus groups

Overarching question with prompts

Part I : Access to services and advice

1. Where do you get your veterinary and animal health advice from?
2. How easy it is to get a veterinary consultation?
3. How many Animal Health Technicians (AHT) are there in the region? What would you consult them about?
4. Do you ever consult your veterinary drugs supplier for information and advice? (Such as: Information on disease conditions in your animals, disease prevention and correct husbandry practices?). Please explain your answer.
5. What information do dispensers provide information on withdrawal periods or drug use when you buy your drugs?
6. When you get your animal medicines, what are you told about how to use/administer the drugs you bought? (Such as: How and where to administer the drug, how to handle the drug during use) .
7. When buying animal medicines, do you tell the dispenser which product you want or are you advised which drugs to buy? What do you ask for?
8. If the dispenser advises you, what reasons does he/she provide for the choice?
9. Are the medicines you require always available at the drug store? Please explain your answer.
10. Does it matter to you in what pack sizes or volumes medicines are sold? If so, why?

Part II: Disease and disease risks

1. Tell me about your livestock, your enterprise and production.
2. What do you think are the main disease risks from your livestock? What clinical signs do you commonly see?
3. Which of these diseases worry you the most? Can you explain why these diseases worry you?
4. Which diseases are reportable?
5. Are you aware of any diseases that can be passed on from livestock to humans? Or from pets to humans? If so, which ones are you aware of? Can you comment on how serious they are?
6. For example, in your opinion, does abortion in animals pose a risk to human health?

Part III: Use of veterinary medicine

1. What animal drugs do you most commonly use, and why do you use them?
2. What do you know about the risks to people from contact with animal drugs. Where has this information come from (Such as :Veterinarian, agricultural merchant, AHT).
3. When buying your animal drugs, how are you advised how to dispose of used drug medicine containers?
4. Have you ever had any adverse effect (e.g. rash, sickness etc) after treating livestock? Provide details of the drug and the effect.
5. Have you ever observed any adverse effect on your livestock after treatment? (eg. abortion, death, passing out etc? Please give details of drug and the effect.
6. Do you put on gloves and nose cap when using dips?

7. Do dispensers ask if you milk your cattle or goats before giving you the medicines or whether you farm for meat, milk or wool?
8. Do you ever report if a medicine caused side-effects in your animals? If you do, whom do you report to?
9. Do you sometimes use animal medicines to treat another animal than the one it is recommended for? (eg. Medicines for sheep in goats or cattle in goats?)

Would you like to add anything else or make any further comments on what we have talked about today. **Close**