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APPENDIX II - GUIDE TO DEVELOP A LUMPY SKIN DISEASE EMERGENCY VACCINATION PLAN

Purpose

The purpose of this document is to help central level veterinary services to develop an emergency vaccination plan for an outbreak (or anticipated outbreak) for lumpy skin disease (LSD). It applies not only to response to LSD outbreaks within the national territory, but also when outbreaks are detected in neighboring countries.

Overview

"Lumpy skin disease (LSD) is recognized as a major threat to cattle and cattle production, with substantial impacts on livelihoods and food security, particularly among smallholders. While no relevant cost-benefit studies have been undertaken yet, it seems that preventive vaccination in a sufficiently wide buffer zone is a logical approach to protecting a disease-free country from LSDV contagion when the virus is present across a border, taking into account geographical contours, vehicle transport access and host population densities."
(http://www.fao.org/3/a-i7827e.pdf)

Therefore, if the primary choice of strategy to prevent and control/eradicate LSD is through vaccination, adequate plans and preparations are needed to be in place, including an emergency vaccination plan.

Throughout this document we will use the term emergency vaccination - meaning a vaccination program applied as an immediate response to an outbreak within the territory or increased risk of introduction or emergence of LSD, as opposed to routine systematic (preventive) vaccination programs - which would be carried out on a regular basis at set intervals.

There are different vaccination approaches that can be applied alone or in combination, depending on the situation and are defined in the Terrestrial Animal Health Code Chapter 4.17
(http://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_vaccination.htm):

1. **Barrier vaccination**: means vaccination in an area along the border of an infected country or zone to prevent the spread of infection into or from a neighboring country or zone.
2. **Blanket vaccination**: means vaccination of all susceptible animals in an area or an entire country or zone.
3. **Ring vaccination**: means vaccination of all susceptible animals in a delineated area surrounding the location where an outbreak has occurred.

4. **Targeted vaccination**: means vaccination of a subpopulation of susceptible animals.

Barrier and blanket vaccination should be the primary approach in case of LSD vaccination. Ring vaccination should be avoided.

Vaccinating against LSD

What are the benefits of vaccination?

- Proved as best tool for quick and effective control of LSD;
- Reduces the total number of susceptible animals within the population, thus preventing entry (in the case of preventive vaccination) and spread of the disease;
- Protects the animals from the clinical manifestation of the disease, thus preventing direct and indirect economic losses;
- Easier to implement than sanitary measures (i.e. stamping out);
- In most cases costs are less compared to stamping out strategies;
- Advantages over other strategies from animal welfare, environmental and sociological aspects.

What are the potential drawbacks of vaccination?

- Longer waiting period after last outbreak to achieve disease free status;
- As clinical signs will not appear, clinical surveillance for the disease will be limited to a subpopulation (newborn stock, after maternal immunity disappears) and animals left unvaccinated for a number of reasons;
- Adverse reactions, although very rare, mild and short-lived, have been recorded and need to be well explained to farmers to prevent their reticence to have their animals vaccinated. Such reactions may include:

Important information about vaccination

- A high quality vaccine (including Neethling strain) is always recommended (e.g. to help ensure appropriate protection against disease).
- In case of LSD, there is no DIVA vaccine (i.e. differentiating infected from vaccinated animals based on antibodies). But PCR-based DIVA assays with the current vaccines for discrimination between field and vaccine virus strains exist (Agianniotaki et al., 2017);
- It takes about 1-3 weeks post vaccination to develop sufficient immunity.
- Vaccines require special facilities, storage and handling conditions, as well as trained people to vaccinate them.
- A poor quality or defective vaccine will give a false sense of security, while not conferring full protection to the animals.
- It may affect the trading (mostly export) ability of live cattle or products of a country.
- Vaccines and vaccination cause extra costs which have to be covered.

Detection and Preparedness for a Lumpy skin disease outbreak

It is out of the scope of this guide to detail the various measures to be taken to prevent the entry of disease into the country, but it must be highlighted that preventing entry is the first line of defense. Further details on prevention and detection can be found in the FAO Lumpy Skin Disease Field Manual (www.fao.org/3/a-i7330e.pdf).

Emergency Vaccination Plan

There are multiple ways to lay down an emergency vaccination plan. The key consideration is that the end product shall contain all the necessary preparedness needs and ensure that everything is ready to carry out an emergency vaccination successfully, when triggered.

Outline of a plan – the key elements:

1) **Emergency vaccination aims, objectives and strategy**

   It is very important to have a clear idea what is the aim, what are the objectives and which strategies will be used during the emergency vaccination.

   The **aim** is a broad statement of intent. It should explain how vaccination will contribute to the control of LSD.

   Examples:

   - "The strategic aim of the vaccination program is to reduce and stop the spread of LSD in case of an outbreak"
   - "The strategic aim of the vaccination program is to prevent economic losses of farmers due to clinical manifestation of disease"
   - "The strategic aim of the vaccination program is to prevent the entry of LSD from region/country X"

   The **objectives** are measurable ways to achieve the aim. They should explain how the aim will be achieved. They always start with a verb like reduce, increase, prevent, etc.

   Examples:

   - Reduce the overall number of outbreaks of LSD
   - Prevent the spread of LSD further in the affected area and to free areas
   - Minimize economical losses to farmers and maintain food-security
   - Protect the high economic value properties from LSDV infection
   - Reduce the number of culled animals due to infection of LSD
   - Reduce the number of LSD susceptible animals

   The **strategies** describe how the emergency vaccination will be implemented in the field to achieve the objectives. In other words, the specific details to be decided upon. A detailed list of questions on strategies can be found under the section Emergency Vaccination Strategies. It should be noted that as strategies relate to the objectives, if the strategies are not feasible, they will not contribute efficiently to meet the objectives.

2) **Logistics**

Logistics ensure that the selected vaccine, will be received from the supplier on the exact day as requested (considering also airline shipping delays), in enough amount and right packages and under the right storage conditions, and delivered, in a traceable manner to the farms where it is needed without delay.

Public (routine and emergency) procurement procedures (if required) or vaccine banks are very important to be ready. A central facility should exist (i.e. Central Vaccination Storage Center lead by a National Vaccination Manager), where the vaccine is stored prior distribution to local facilities (i.e. Local Vaccination Distribution Points lead by the Local Vaccination Mangers), where it is handed over to the veterinarians.

The managers are responsible to keep records on how much and where the vaccines were used and collect unused vaccines after vaccination.

3) Workforce

The workforce ensures that the human resources, legal authorization, technical knowledge and equipment needed to vaccinate the animals are available, and records of the emergency vaccination are collected. Tasks include: establishing a roster of vaccinators and form vaccination teams who will carry out vaccination, purchasing and distributing vaccination equipment, maintaining the cold chain, developing vaccination record cards, and training vaccination teams. Budget source and procedure to pay non-government workers (if planned to use them) should be prepared.

4) Biosecurity

Biosecurity ensures that the disease is not spread due to the emergency vaccination activities. Tasks include of purchasing biosecurity equipment and training vaccination teams on (personal and farm-level) biosecurity principles.

5) Surveillance

Surveillance ensures that 1) animals outside the vaccination zone are examined to prove that the disease did not escape the vaccination zone; 2) animals in the vaccination zone are clinically checked prior vaccination to be disease free; and 3) adverse reaction to the vaccine are reported in unified form and investigated.

Therefore, surveillance tasks are carried out both outside the vaccination zone (in a 20-50 km surveillance zone around the borders of the vaccination area) and inside the vaccination zone: before and after vaccination has occurred.

Ideally, all farms and herds should be examined prior to vaccination, to rule out the clinical presence of the disease. This can be done by the vaccination team at the time of vaccination, by calling the animal owner or handler to certify that the animals do not show clinical signs, or by sending surveillance teams prior the arrival of the vaccination team. Surveillance activities should be implemented in the same maner during the 28 days post vaccination to detect LSDV already in incubation or adverse reactions due to the vaccine.

6) Livestock identification, database and traceability

Livestock individual identification and traceability ensure that vaccinated animals are marked and recorded in a central official electronic database. Extra visual post-vaccination marking

can be used to ensure that movement of vaccinated and non-vaccinated animals can be adequately controlled.

7) Post-vaccination monitoring and evaluation of the vaccination program

To evaluate the vaccination program, first we should check if the defined objectives have been met. As objectives should be measurable, this would provide evidence of the success or failure of the vaccination program.

Second, we should look at outbreaks occurring among the vaccinated population. The time of the vaccination, incubation period and the occurrence of the clinical signs are very important in this matter. Adverse reaction to vaccination should be investigated and laboratory differentiation (molecular assays or gene sequencing) can be used to determine if the cause of the clinical signs is due to a field strain or a vaccine strain of LSDV.
If outbreaks occur 28 days or more after the emergency vaccination was conducted, this could indicate that vaccination did not led to sufficient protection against LSD. These outbreaks should be investigated thoroughly to determine the cause of insufficient protection. Possible causes could be: low quality of vaccine, vaccination was not implemented, lower vaccine dose was applied, vaccine not properly stored and/or managed,etc).

Third, specific measures can be determined. As example the **vaccine coverage** which is calculated by dividing the vaccinated population (number of animals vaccinated) by the eligible population (number of animals intended to be vaccinated at the beginning of the emergency vaccination). The vaccinated population can be based either on the number of vaccine doses distributed, or on the number of vaccines administered (using records). The second approach would give a more accurate measure. Vaccine coverage should be at least above 80% to achieve herd immunity and to avoid further virus circulation.

In the case of LSD, it is problematic to determine the **vaccinated population immunity** (calculated by dividing the immunized population by the vaccinated population), as antibody levels do not always rise in all vaccinated animals, thus making it difficult to calculate the immunized population. A strong decrease or entire lack of LSD outbreaks is a strong indication of proper vaccination strategy and implementation.

8) Communication strategy and key messages

It is essential for the success of the emergency vaccination to obtain the approval of the various stakeholders. In order to be able to deliver key messages effectively, it is important to first establish a clear strategic aim and objectives (as discussed in point 1), as these will form the basis of the communication strategy. As previously discussed, the aim will show how the emergency vaccination contributes to the LSD control; the objectives will describe how the aims will be achieved.

Probably the most important stakeholder are the farmers (animal owners). Their approval is of highest importance. Therefore, the benefits and drawbacks of the vaccination should be

clearly explained to them. This can be done either through leaflets or even better through farmers' meetings. The main messages could be:

- Vaccination will prevent the appearance of clinical signs and thus prevent economic losses
- Vaccinated animals will not develop disease, if not already in incubation, therefore stamping out of vaccinated herds can be avoided
- Vaccinated animals will produce safe commodities which can be safely consumed and traded
- Minor adverse reactions, such as: swelling at the vaccination site, which are not harmful and disappear within 1-2 weeks; short lived fever; slight decrease of milk production or small skin or udder nodules (Neethling disease) that disappear within several days may rarely follow vaccination..

In a strict sense, only points 2-6 may be considered key elements to operational preparedness to effectively implement emergency vaccination in the field. Although complementary to the operational elements, points 1, 7 and 8 are generally considered out of scope for vaccination operations, but are still highly relevant to cover all the aspects of emergency vaccination.

Emergency vaccination strategies

There are number of strategic issues to be considered for the implementation of an emergency vaccination.

a) When is the disease most likely to trigger emergency vaccination? (i.e. when LSD is detected in a neighboring country close to your country border, or only when LSD is detected within your country)
b) How large and what shape will be the vaccination area (in km^2) and why is it defined as a high risk area for entry of disease (i.e. based on a risk assessment process)?
c) How many epidemiological units (number of village/herd/other) will need to be vaccinated and how are they distributed within the vaccination area?
d) How many animals (number) will be vaccinated, what is their distribution within the area, herds sizes and management types (i.e. dairy, beef, feedlot, mixed)?
e) How many vaccine doses (number) are available, in what size of vials, prior starting the emergency vaccination? (Minimize loses of vaccine as possible, as most manufactures recommend that once the bottle is open it should be used during the same day)
f) How fast, i.e. how many days will it take for the emergency vaccination to be carried out?
g) How many trained people will be needed to carry out the vaccination in the given area within the given timeframe?
h) How much equipment is needed to carry out the planned emergency vaccination?
i) How will the emergency vaccination be funded?
j) Which approach(es) will be used, i.e. application of barrier (define width along the border), or blanket (define area)?
k) Will there be priorities within the vaccination zone, such as priority subpopulations? For example, should commercial farms be vaccinated first and smaller farms later? Are there particularly valuable stock that need to be protected?

l) How will vaccination be carried out when applying ring or barrier vaccination? –For example, starting from the outbreak location moving outwards, or starting at the periphery moving inwards?
m) How will vaccinated animals and herds be identified and recorded after being vaccinated?
n) At what age will the animals be vaccinated ?(as a recommendation: vaccinate at all ages if not previously vaccinated and calves from vaccinated mothers should be vaccinated at 3-4 months
o) What is the exit strategy after vaccination was carried out and how many further vaccinations are planned after the emergency one is conducted?

Consideration on the vaccine and vaccine provider

It is recommended to always use high quality vaccines, because poor quality vaccines may lead to a lack of protection and ultimately higher costs due to inefficient of disease control.

Currently, only live vaccines are available against LSDV. The most common strain used in the LSD attenuated vaccines is the Neethling strain.
In countries where sheep pox is also present, a possible alternative are vaccines containing attenuated sheep pox virus strains, e.g.: RM-65. In these cases, increased dosage needs to be used. However, based on field studies, LSDV Neethling vaccines are more effective than RM-65 (at ten times of the small animal dose).
Where goat pox is also present, attenuated goat pox virus strain can be used, like the Gorgan goat pox strain.

For a detailed list of available LSD vaccines, per supplier, please see the table below, (extracted on 11 September 2018 from the website of The Center for Food Security and Public Health at http://www.cfsph.iastate.edu/Vaccines/disease_list.php?disease=lumpy-skin-disease&lang=en). Alterations to the original table appear in Italics.

Lumpy skin disease vaccines (in Alphabetic order)

Dollvet

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
LUMPYDOLL	Live	KSGPV 0240	None	Iraq, Turkey
LSD-NDOLL	Live	Neethling	None	Iraq

FGBI - Federal Centre for Animal Health

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
Cultural Dry Virus Vaccine Against Sheep Pox and Lumpy Skin Disease	Live	Not Available	None	Belarus, Kazakhstan, Russian Federation
Sheep Pox and Lumpy Skin Disease Dry Virus Vaccine	Live	Not Available	None	Belarus, Kazakhstan, Russian Federation

Kenya Veterinary Vaccines Production Institute (KEVEVAPI)

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
LUMPIVAX™	Live	Neethling	None	Kenya

M.C.I. Santé Animale

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
BOVIVAX LSD-N	Live	Neethling	None	Botswana, Cameroon, Egypt, Cote d'Ivoire, Kenya, Mali, Mauritania, Morocco, Saudi Arabia, Senegal, South Africa, Tanzania, Uganda

Merck Animal Health (MSD Animal Health)

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
LUMPYVAX™	Live	*Neethling (based on Mathijs et al., 2016)*	None	Angola, Botswana, Burundi, Congo (Dem. Rep.), Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe

National Veterinary Institute (NVI)

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
Lumpy Skin Disease Vaccine	Live	Not Available	Not Available	Ethiopia

Onderstepoort Biological Products

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
Lumpy Skin Disease Vaccine for Cattle	Live	Neethling	None	South Africa

Vetal Animal Health Products S.A.

Product Name	Type	Strain/Subtype	Adjuvant	Licensed Countries
Lumpyvac™	Live	Attenuated Neethling	None	Turkey

For Sheep and Goat Pox vaccines please visit the website of The Center for Food Security and Public Health http://www.cfsph.iastate.edu/Vaccines/disease_list.php?disease=sheep-pox-and-goat-pox&lang=en

Further considerations on the vaccine provider:

- The number of doses that can be provided by the manufacturer in a given period of time
- The clearance process at the border/customs
- The time needed for the vaccine to be shipped to a designated central facility
- Flexibility in the how many doses are within a vial, as the target population would influence the dosage needs, i.e. when vaccinating small backyard premises, vials with lower doses are preferred.
- Possibility of exchanging expiring vaccines with a fresh stock of vaccines, or to sell them to other countries
- Production site quality control standards and proof of testing.

Further considerations on the vaccine:

- Shelf-life and expiry date (especially if the vaccine is stored in the country)
- Onset of immunity
- Duration of immunity
- Adverse reactions, both the type of reaction and their prevalence in the vaccinated population
- Past experience of other countries

The cost per dose should not play a major role. The emphasis must be on the use of high quality vaccines, as per independent expert advice.

Exit strategy

The ideal outcome of the control strategy in affected countries is to eventually regain the status of LSD freedom of the country (or zone). The requirements to gain/re-gain freedom of LSD are described in the OIE Terrestrial Animal Health Code Chapter 11.9. Infection with LSD.

A summary is given in the table below, where the time periods refer to the time needed to gain/re-gain the LSD free status, during which time LSD has not occurred and vaccination has been prohibited in the given zone or country, and the respective surveillance activities (laid down in article 11.9.15) have been applied.

	Only clinical surveillance	**clinical, virological and serological surveillance**
Only vaccination	3 years	2 years

Stamping-out and vaccination	26 months	14 months

The table shows that, in all cases, vaccination needs to be prohibited in order to be eligible to regain freedom. LSD vaccination withdrawal decision and tactics would depend on the individual country situation and risk (estimated through a specific risk assessment).

The important criteria/discussion points should be:

- Was the virus circulation stopped after the emergency vaccination?
- Is the likelihood of introduction or re-introduction of LSD sufficiently reduced, based on the situation in neighboring countries?
- Is the sensitivity of surveillance (early detection) high enough to detect re-emergence?
- Is the level or preparedness adequate in case of re-emergence (contingency plan, early response), with a special attention on containing disease, maintaining a vaccine stock and carrying out emergency vaccination?
- Is there political or economic risk or gain to stop vaccination considering: trade and farmer, industry, politicians and public response/perception?

Key element	Operational phase	List of policies, plans, standard operating procedures (SOPs), work instructions, checklists or templates required
Logistics	Pre-vaccination operations	• Finalize public procurement (if needed) to purchase and/or order vaccines • Template for ordering, and/or purchase of vaccine from national bank/ vaccine manufacturer/ supplier is available; • Vaccine importation (including air transport), customs clearance and necessary permits (where relevant), including communication and logistical coordination with vaccine manufacturer/supplier. Relevant contact persons should be stated; • In-house or independent quality control of vaccine batches, including in vitro laboratory testing (with confirmation of vaccine virus identity; defining the vaccine virus titer on cell culture; testing for the presence of the contaminants) should be considered; • LSD confirmation, doses available and/or request for doses; • Designation of a Central Vaccination Storage Centre and Field Vaccine Distribution Points or equivalent; • Location, responsibilities and contact details of the National Vaccination Manager at the Central Vaccination Storage Centre or equivalent (identify in advance); • Location, responsibilities and contact details of the Local Vaccination Manager(s) at the Field Vaccine Distribution Point(s) or equivalent (identify in advance); • Responsibility for cold chain maintenance within storage centre facilities - Vaccine to be stored at temperature as required by the manufacturer. Temperature to be recorded on daily basis; • Responsibility for supply of vaccination equipment to accompany vaccine; • Provision of appropriate transport for vaccine, equipment, personnel and funding for maintenance and fuel;
	Vaccination operations	• Control of vaccine stock by National Vaccination Manager/Central Vaccination Storage Centre or equivalent; • Ordering and control of vaccine by Local Vaccination

Key element	Operational phase	List of policies, plans, standard operating procedures (SOPs), work instructions, checklists or templates required
		Manager/Field Vaccine Distribution Point or equivalent; • Control of vaccine stock and information requirements for orders of vaccine received and dispatched, including: ▪ Batch number and expiry date ▪ Quantity provided or received ▪ Source ▪ Contact details or recipient responsible for vaccine ▪ Dates of transport ▪ Means of identification of vaccine ▪ Intended use: administer to animals or destruction of vaccine (if not used-up fully); • Vaccine storage and handling guidelines; • Vaccine package user instructions (in national language);
	Post-vaccination operations	• Responsibility for inventory control and steps for managing vaccine distribution and receiving un-administered doses; • Quality assurance and auditing (inventory of vaccine used, including following minimum information): ▪ Batch numbers (serial number, expiry date) ▪ Legal description of vaccination zone and premises location where administered; ▪ Date of vaccination; ▪ Identification numbers of vaccinated animals; ▪ Temperature log data for cold chain; ▪ Any additional information deemed appropriate; • Vaccine inventory template;
Workforce	Pre-vaccination operations	• Organizational structure (chart) of the vaccination coordination and delivery network; • National Vaccination Manager/Central Vaccination Storage Centre or equivalent; • Local Vaccination Manager/Field Vaccine Distribution Point or equivalent; • Staff responsible for cold chain management; • Staff responsible for supply of vaccination equipment • Coordination between various organizational levels and stakeholders (Veterinary Services, commercial suppliers, etc.); • Develop Vaccinator training content • Ensure legislative authority to vaccinate
	Vaccination operations	• Identify personnel to compromise vaccination teams; • Procurement contract template for vaccination personnel, if required; • Define vaccination team size, structure, functional roles; • Define Training requirements for vaccination team and delivery methods of training; • Health and safety guidelines; • Vaccination team work flow/process (chart);
	Post-vaccination operations	• Post-vaccination field visit debriefing checklist • Capturing records upon return from vaccination field visits;

Key element	Operational phase	List of policies, plans, standard operating procedures (SOPs), work instructions, checklists or templates required
Biosecurity	Pre-vaccination operations	N/A
	Vaccination operations	• Biosecure entry-exit of premises to be vaccinated; • Personal protective equipment (PPE) checklist, if needed; • Instructions on good vaccination practice, including needle hygiene and heat sterilization of reusable equipment; • Cleaning and disinfection checklist;
	Post-vaccination operations	• Biosecure decontamination, and/or disposal and return of unused vaccine and disposable equipment;
Surveillance	Pre-vaccination operations	• Generating lists of priority areas and or premises; • Database; herd size, type, location, contact persons, private veterinarians, regional veterinary authority • Farmer contact checklist;
	Vaccination operations	• Clinical surveillance of animals to be vaccinated; • Sampling protocols in case of LSD suspicion; • Checklist for sampling and inspection; • Protocol if LSD infection detected; • Administering vaccine to livestock; • Vaccination kit checklist; • Reporting chain of command for any clinical suspicion during vaccination or odd events • Information package for vaccinated premises (including notice of legislative authority to enter premises and vaccinate animals, owner's rights, factsheet on LSD vaccination, information on support networks and sources of advice, etc.);
	Post-vaccination operations	• Refer to post-vaccination monitoring and vaccination programme evaluation plan; • Adverse vaccine reaction recording template;
Livestock identification and traceability	Pre-vaccination operations	• Responsibility for supply of animal identification equipment to accompany vaccine (including, e.g. contracts, arrangements with commercial suppliers);
	Vaccination operations	• Permanent identification type (e.g. ear tag, tattoo, etc.) for vaccinated animals, per species/production sector/holding type, etc.; • Checklist to ensure that the equipment to tag animals after vaccination is in order (e.g. ear tag piercer, tattooing equipment); • Vaccinated animal identification recording template;
	Post-vaccination operations	• Quality assurance and auditing (record the following minimum information, if applicable): ▪ Movement permits (origin and destination) of any vaccinated animals; ▪ Date and location of destruction or slaughter; ▪ Destination and intended end-use of animal products; • Data entry operations manual.

Key LSD-specific facts to be considered when planning for emergency vaccination:

Incubation period: experimentally 4-7 days, but can be up to 5 weeks

Onset of immunity: Immunity starts to develop around 10 days after vaccination and is completed by 3 weeks. For administrative and legal purposes, consider 28 days after vaccination.

Rate of spread of disease: It is very difficult to determine an average rate of spread as many factors influence the spread of the disease. Based on the LSD epidemic in Southeast Europe, where a median spread rate of 7.3 km/week was observed, one could assume that the average rate of spread could fall between 5 and 20 km per week. However, long distance jumps may occur related to the transport of infected cattle.

Seasonality: Depends on vector abundance. In some regions, there might not be a vector-free period. As a rule of a thumb in Europe (and Turkey), the following observations were made:
Highest number of outbreaks occurred between May and July. Also in April and August-November the number of outbreaks were still relatively high. The period between December and March had the lowest number of outbreaks overall. Based on this, vaccination should start and end before the vector free / vector scarce period ends.

Outbreak detection delay: It is an important factor to take into account and it is safer to plan with a couple of weeks of detection delay when making assumptions.

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