Requirements of the *Terrestrial Code* for PPR surveillance

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World Organisation for Animal Health
Organisation mondiale de la santé animale
Organización Mundial de Sanidad Animal

Chapter 1.4 – Animal Health surveillance

Animal health surveillance can be defined as the systematic, continuous or repeated measurement, collection, collation, analysis, interpretation and timely dissemination of animal health-related data from defined populations, for the purposes of taking action to control disease

(definition adapted from Hoinville et al., 2013)

Chapter 1.4 – Animal Health surveillance

CHAPTER 1.4.

ANIMAL HEALTH SURVEILLANCE

Article 1.4.1.

Introduction and objectives

1. In general, *surveillance* is aimed at demonstrating the absence of *infection* or *infestation*, determining the presence or distribution of *infection* or *infestation* or detecting as early as possible exotic diseases or *emerging diseases*. Animal health *surveillance* is a tool to monitor disease trends, to facilitate the control of *infection* or *infestation*, to provide data for use in *risk analysis*, for animal or public health purposes, to substantiate the rationale for *sanitary measures* and for providing assurances to trading partners. The type of *surveillance* applied depends on the objectives of the *surveillance*, the available data sources and the outputs needed to support decision-making. The general recommendations in this chapter may be applied to all *infections* or *infestations* and all susceptible species (including *wildlife*) and may be adapted to national or local settings. *Specific surveillance* is described in some *listed disease*-specific chapters.

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1. Disease reporting systems

   Disease reporting systems are based on reporting of animal health-related events to the *Veterinary Authority*. Data derived from disease reporting systems can be used in combination with other data sources to substantiate claims of *animal health status*, to generate data for *risk analysis* or for early warning and response. Effective laboratory support is an important component of any reporting system. Reporting systems relying on laboratory confirmation of suspected clinical *cases* should use tests that have high specificity as described in the *Terrestrial Manual*.

Disease reporting system falls under the category of «Passive surveillance» indicating that reports are usually initiated from farmers (with the precondition that the disease of concern is notifiable).

Advantages:

- lower cost than active surveillance options;
- farmers are well placed to detect disease in their animals because they observe them every singled day and certainly more frequently than animal health professionals such as veterinarians or paravets/community animal health workers;
- it is most effective when clinical signs are obvious.

Disadvantages:

- it may lead to an inaccurate picture of the disease distribution due to under- or over-reporting, which may be uneven across the country and in different livestock sectors, leading to a biased result;
- Under-reporting can occur for many reasons, including lack of awareness and incentives, or barriers such as inconvenience, stigma and punitive control measures.

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2. Surveys

In addition to the principles in Article 1.4.3., the following should be considered when planning, implementing and analysing surveys.

Surveys may be conducted on the entire target *population* (i.e. a census) or on a sample.

The sources of data should be fully described and should include a detailed description of the sampling strategy used for the selection of *units* for testing. Also, consideration should be given to any biases that may be inherent in the survey design.

Surveys usually take the form of serologcial surveys.

Serosurveys are used to accomplish the objectives of demonstrating freedom OR to obtain a more accurate picture of disease distribution in unvaccinated sub-populations (if it is not possible to differentiate between vacicnated and unvaccinated animals) OR to assess vaccine efficacy OR vaccine coverage.

In unvaccinated sub-populations serosurveys can be more effective than passive surveillance because they do not rely on noticing and reporting clinical signs of disease.

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3. Risk-based methods

Surveillance activities targeting selected *subpopulations* in which an *infection* or *infestation* is more likely to be introduced or found, or more likely to spread, or cause other consequences and contribute to early detection, freedom claims, disease control activities, and estimation of prevalence. Risk-based methods can be used for both probability-based and non-probability-based sampling methods and data collection. The effect of the selection (i.e. its impact on probability of detection) should be estimated.

Risk-based methods should be based on a *risk assessment* and are useful to optimise the use of *surveillance* resources.

Risk-based surveillance aims to take into account the differences in risk for animals in the population

By selecting animals with a higher probability of being infected or higher probability of being detected if they are infected the sensitivity of the surveillance can be increased without increasing the total number of animals to be tested

Risk-based surveillance involves using knowledge of risk factors to improve the probability that we will find disease or infection

If we do not know about the disease or any suitable risk factors it is not possible to use risk-based surveillance

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4. Ante-mortem and post-mortem inspections

   Inspection of *animals* at *slaughterhouses/abattoirs* may provide valuable *surveillance* data. The sensitivity and specificity of *slaughterhouse/abattoir* inspections for detecting the presence of specified diseases will be influenced by:

   a. clinical and pathological signs;
   b. the training, experience and number of the inspection staff;
   c. the extent to which the *Competent Authority* is involved in the supervision of ante-mortem and post-mortem inspections, including reporting systems;
   d. the quality of construction of the *slaughterhouse/abattoir*, speed of the slaughter chain, lighting quality, etc.; and
   e. independence of the inspection staff.

It falls under the category of active surveillance

Can contribute to generate data to inform the overall surveillance system with no additional costs

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5. Surveillance of sentinel units

Surveillance of sentinel *units* involve the identification and regular testing of one or more *animals* of known health or immune status in a specified geographical location to detect the occurrence of *infection* or *infestation*. Sentinel *units* provide the opportunity to target *surveillance* depending on the risk of introduction or re-emergence, likelihood of *infection* or *infestation*, cost and other practical constraints. Sentinel *units* may provide evidence of freedom from, or distribution of, disease, *infection* or *infestation*.

It falls under the category of active surveillance

Can be useful and informative, as an example, along border areas to detect incursions from an infected neighbour

Chapter 1.4 – Animal Health surveillance - methods

7. Syndromic surveillance

   Systematic analysis of health data, including morbidity and mortality rates, production records and other parameters can be used to generate signals that may be indicative of changes in the occurrence of *infection* or *infestation*.

It is an event-based surveillance

It may be considered a pre-diagnosis surveillance aiming at capturing health-related events that can be associated with more than one condition

In the case of PPR may correspond to pneumo-enteritis syndrome

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9. Combination and interpretation of surveillance results

Depending on the objective of *surveillance*, the combination of multiple sources of data may provide an indication of the overall sensitivity of the system and may increase the confidence in the results. The methodology used to combine the evidence from multiple data sources should be scientifically valid, and fully documented, including references to published material.

Surveillance information gathered from the same country, *zone* or *compartment* at different times may provide cumulative evidence of *animal health status*. Repeated surveys may be analysed to provide a cumulative level of confidence. However, the combination of data collected over time from multiple sources may be able to achieve an equivalent level of confidence.

Consider as an example a surveillance system with two components: component 1 is a structured survey and component 2 is abbattoir inspection. Assume that we have analyzed each component and calculated the sensitivity:

$$CSe_1 = 82\%$$

$$CSe_2 = 45\%$$

$$SSe = 1 - [(1 - CSe_1) \cdot (1 - CSe_2)] = 1 - [(1 - 0.82) \cdot (1 - 0.45)] = \mathbf{0.90}\ (\boldsymbol{or}\ \mathbf{90}\%)$$

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Article 1.4.6.

Surveillance for freedom from a disease, infection or infestation

1. Demonstration of freedom

A *surveillance* system to demonstrate freedom from a disease, *infection* and *infestation* should meet the following, in addition to the general principles outlined in Article 1.4.3. It should also take into account any prevention measures in place such as *vaccination* in accordance with this chapter and Chapter 4.18.

Freedom implies the absence of *infection* or *infestation* in an animal *population* in the country, *zone* or *compartment*. Scientific methods cannot provide absolute certainty of this absence. Therefore, demonstrating freedom, except for historical freedom, involves providing sufficient evidence to demonstrate to a desired level of confidence that *infection* or *infestation* with a specified pathogenic agent, if present, is present in less than a specified proportion of the *population*.

2. Requirements to declare a country or a zone free from an infection or infestation

a. Prerequisites, unless otherwise specified in the relevant chapters of the *Terrestrial Code*:

i. the *infection* or *infestation* has been a *notifiable disease*;

ii. an *early warning system* has been in place for all relevant species;

iii. measures to prevent the introduction of the *infection* or *infestation* have been in place: in particular, the importations or movements of *commodities* into the country or *zone* have been carried out in accordance with the relevant chapters of the *Terrestrial Code*;

iv. the *infection* or *infestation* is not known to be established in *wildlife* within the country or *zone*.

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b. Historical freedom

Unless otherwise specified in the relevant chapter of the *Terrestrial Code*, a country or *zone* may be considered free without formally applying a pathogen-specific *surveillance* programme when:

i. for at least the past 10 years:

- no *vaccination* against the disease has been carried out;
- the prerequisites listed in point a) are complied with;

ii. the pathogenic agent is likely to produce identifiable clinical or pathological signs in susceptible *animals*;

iii. for at least 25 years there has been no occurrence of *infection* or *infestation*.

c. Where historical freedom cannot be demonstrated:

i. A pathogen-specific *surveillance* programme has been applied as described in this chapter and in the relevant chapter of the *Terrestrial Code*, and has not detected any occurrence of the *infection* or *infestation*.

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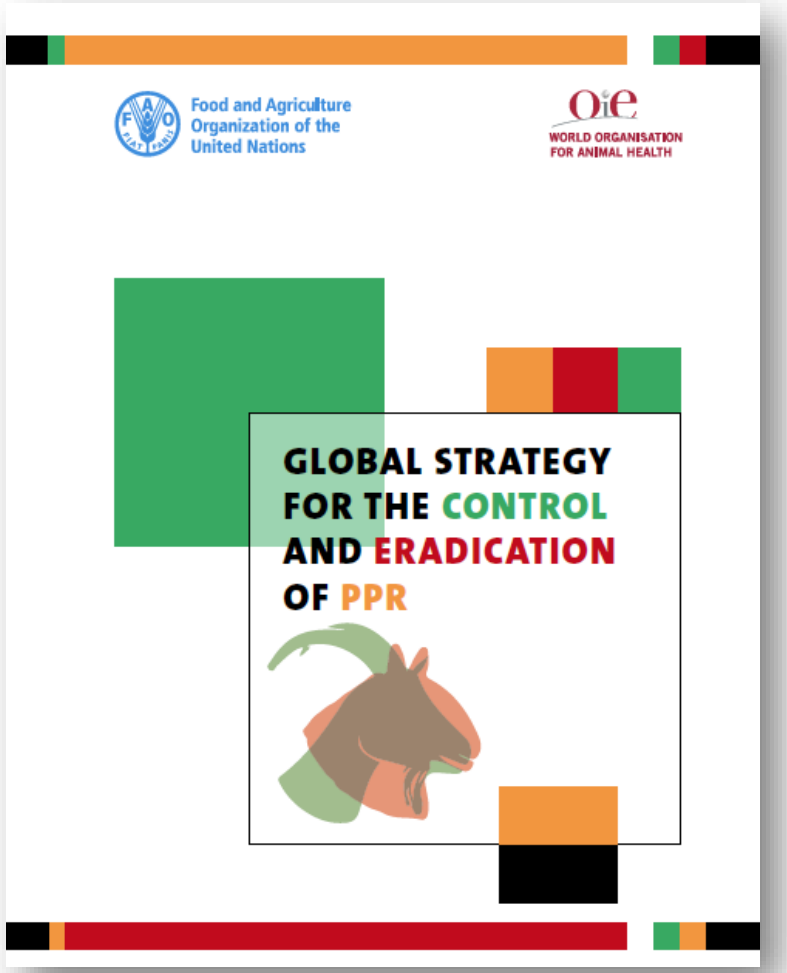
Article 1.4.7.

Surveillance in support of disease control programmes

Surveillance is an important component in disease control programmes and can be used to determine the distribution and occurrence of *infection* or *infestation* or of other relevant health-related events. It can be used to assess progress and aid in decision-making in the control or eradication of selected *infections* or *infestations*.

Surveillance used to assess progress in control or eradication of selected *infections* or *infestations* should be designed to collect data about a number of variables such as:

1. prevalence or incidence of *infection* or *infestation*;
2. morbidity and mortality;
3. frequency of *risk* factors and their quantification;
4. frequency distribution of results of the laboratory tests;
5. post-vaccination monitoring results;
6. frequency distribution of *infection* or *infestation* in *wildlife*.



- **3 components**
  - PPR control and eradication (stepwise approach)
  - Strengthening VS
  - Improving the prevention and control of other major diseases of small ruminants

GLOBAL STRATEGY FOR THE CONTROL AND ERADICATION OF PPR

At national level

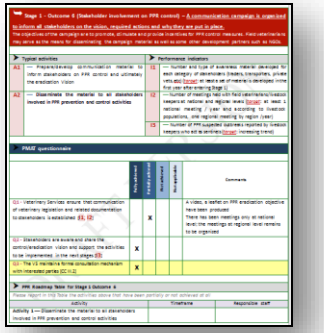
Component 1 → PPR C & E

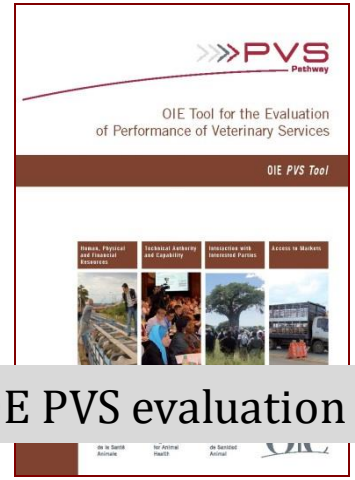
Component 2 → Strengthening Veterinary Services

Component 3 → Combined prevention and control of other major diseases of livestock

PPR step-wise approach

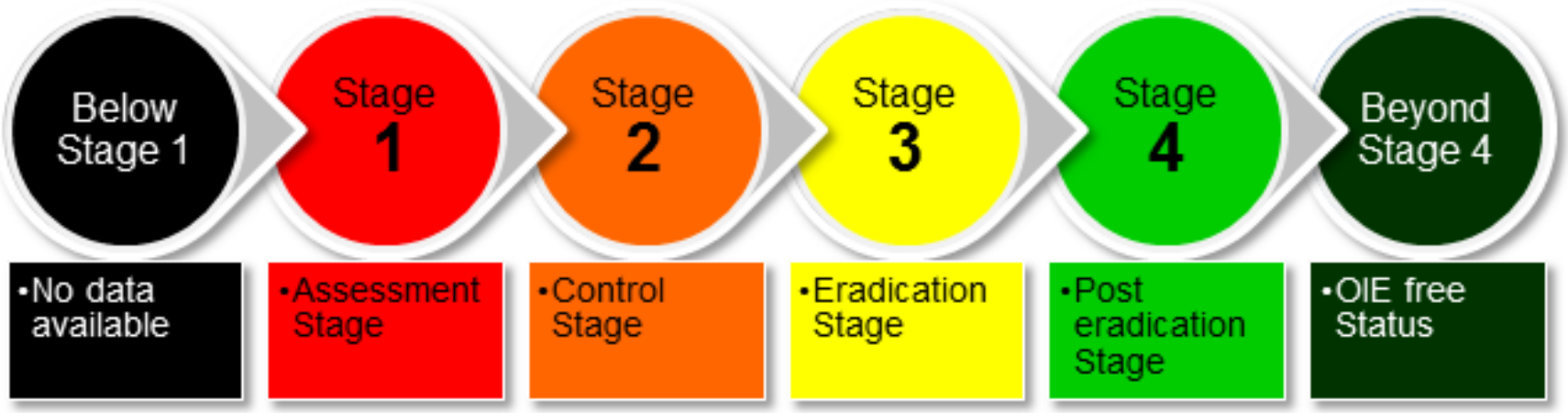
PMAT tool





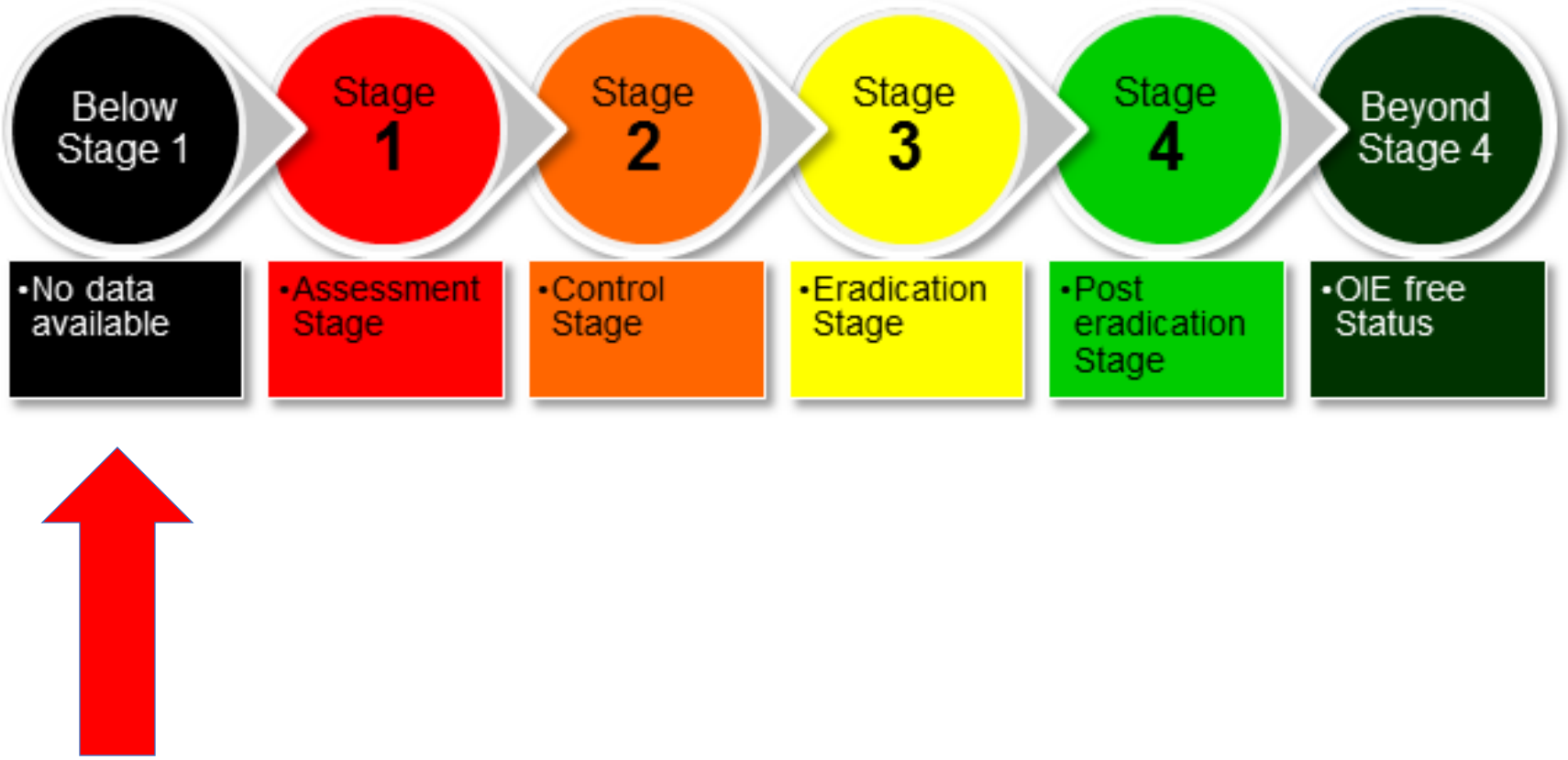
OE PVS evaluation Tool

PPR Stepwise approach



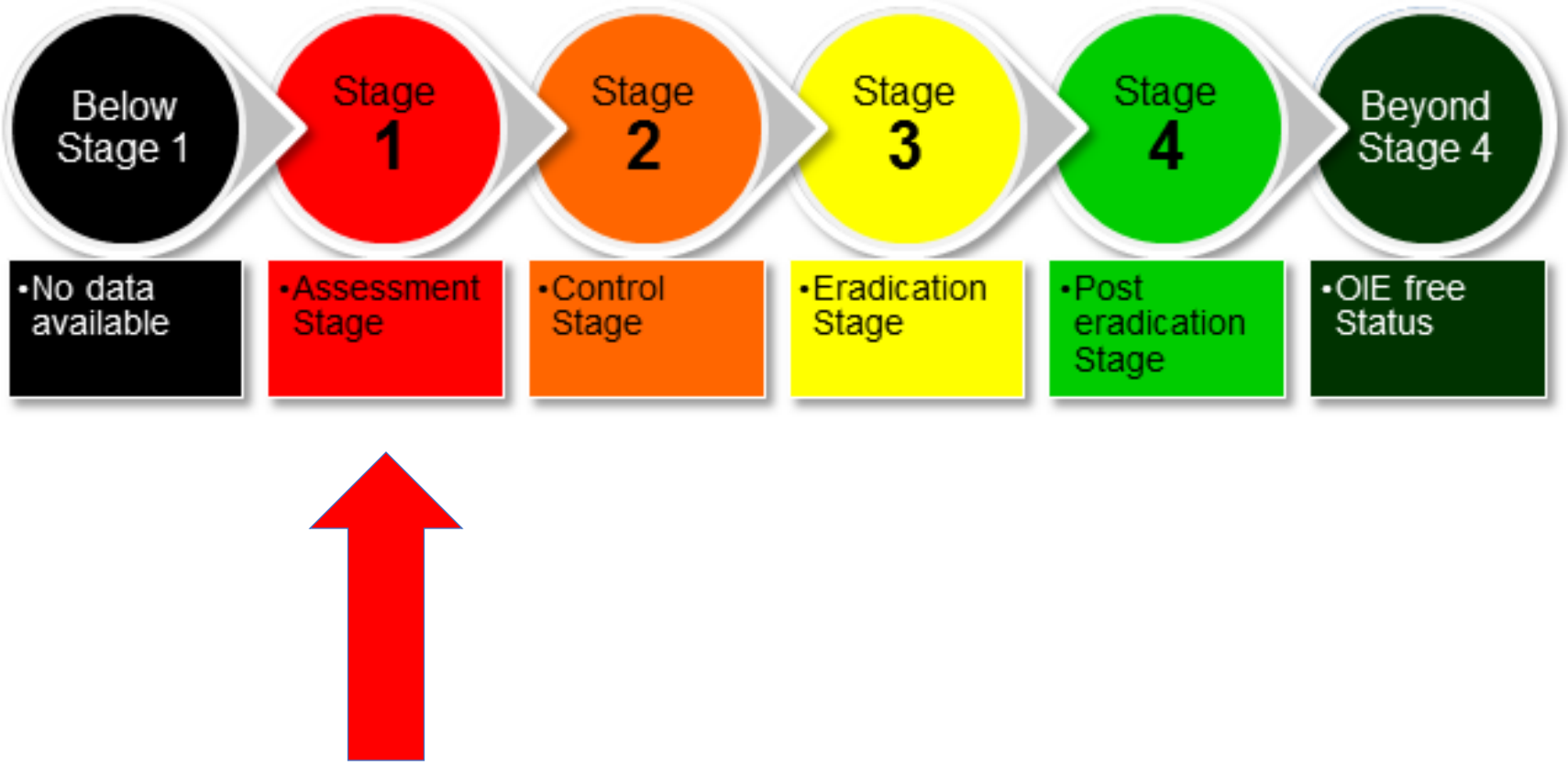
Graph 1 – **The Progressive Stepwise Approach** for the prevention and control of PPR

PPR Stepwise approach



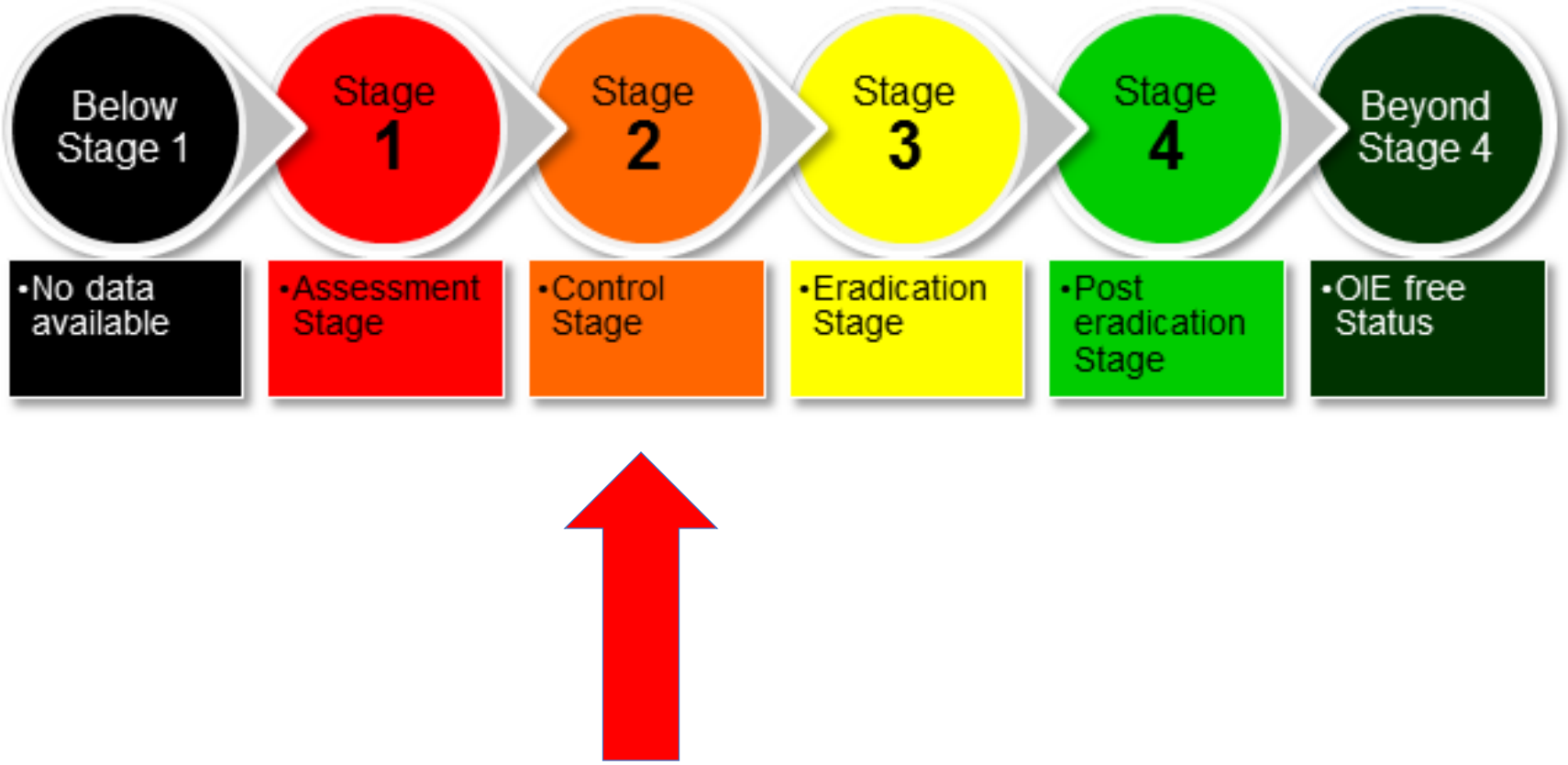
A COUNTRY WHERE THERE ARE INSUFFICIENT AND UNSTRUCTURED DATA TO UNDERSTAND THE TRUE RISK FOR PPR CANNOT BE CATEGORISED IN ANY OF THE 4 STAGES (I.E. IS 'BELOW STAGE 1')

PPR Stepwise approach



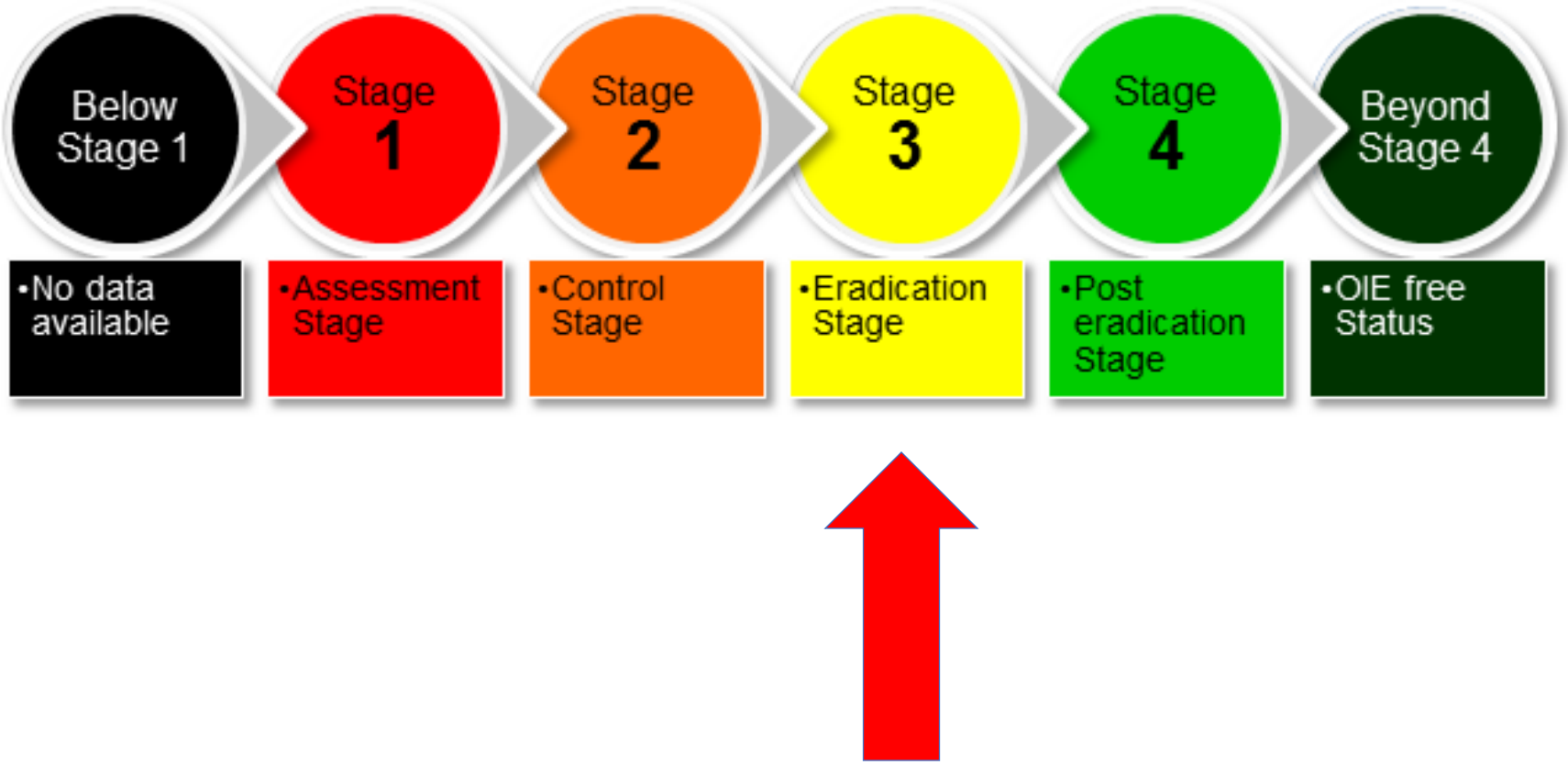
Stage 1 Focus: **TO GAIN A BETTER EPIDEMIOLOGICAL UNDERSTANDING OF THE PRESENCE (OR ABSENCE) OF PPR**

PPR Stepwise approach



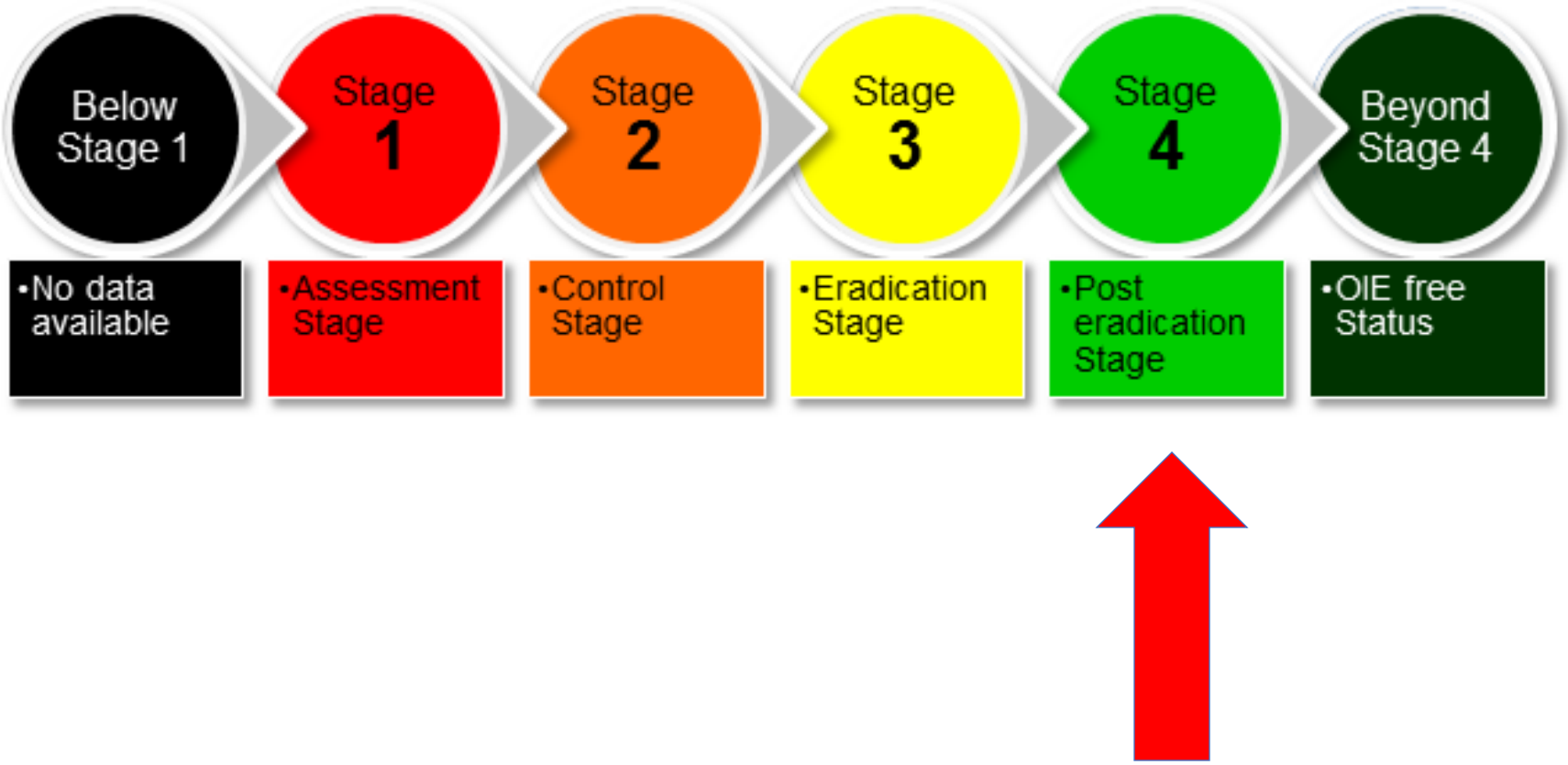
Stage 2 Focus: **TO CONTROL BOTH PPR CLINICAL DISEASE AND INFECTION IN A SPECIFIC AREA OR PRODUCTION SYSTEM**

PPR Stepwise approach



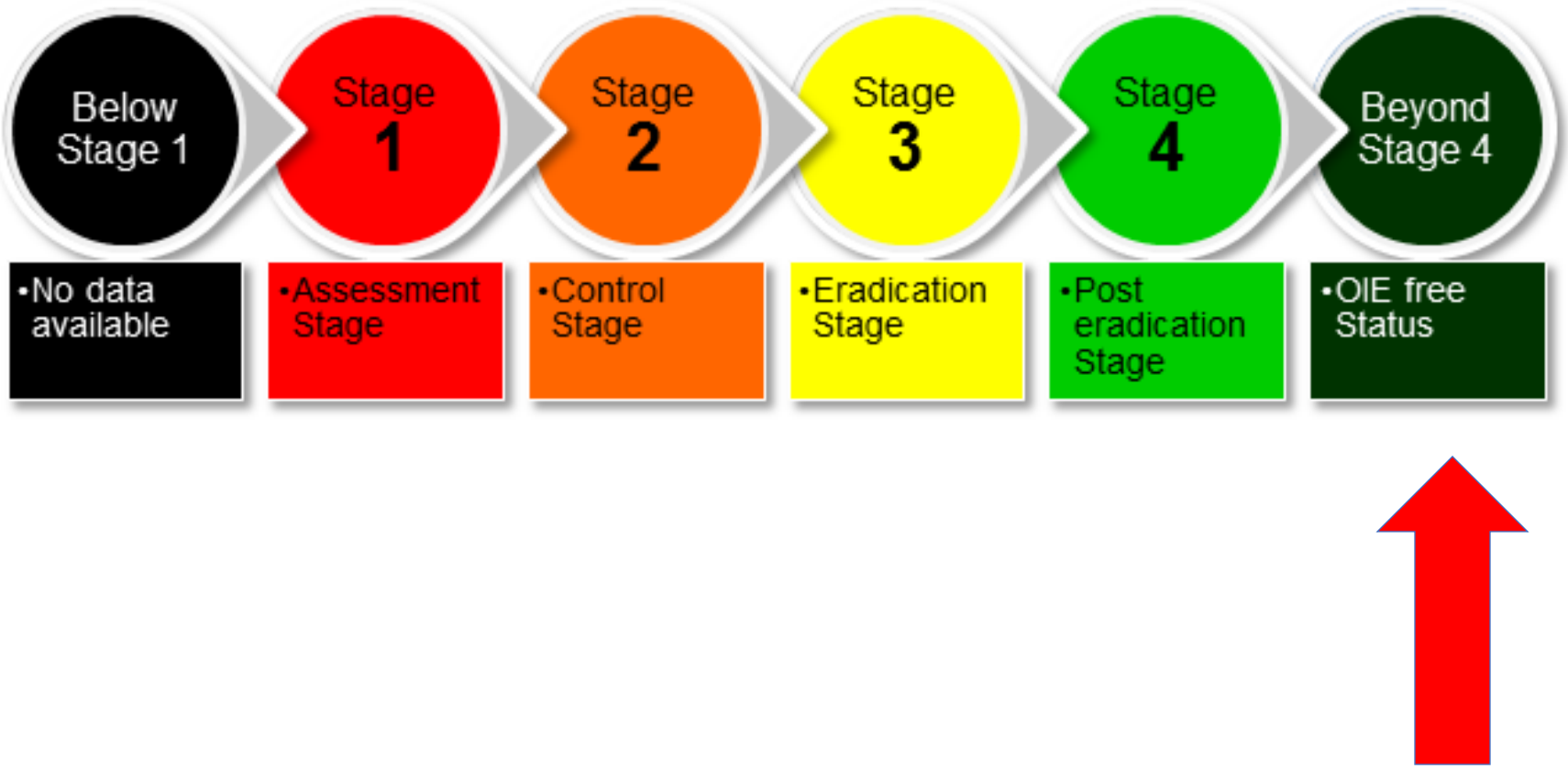
Stage 3 Focus: **TO ACHIEVE THE ERADICATION OF PPR FROM THE NATIONAL TERRITORY OF THE COUNTRY**

PPR Stepwise approach



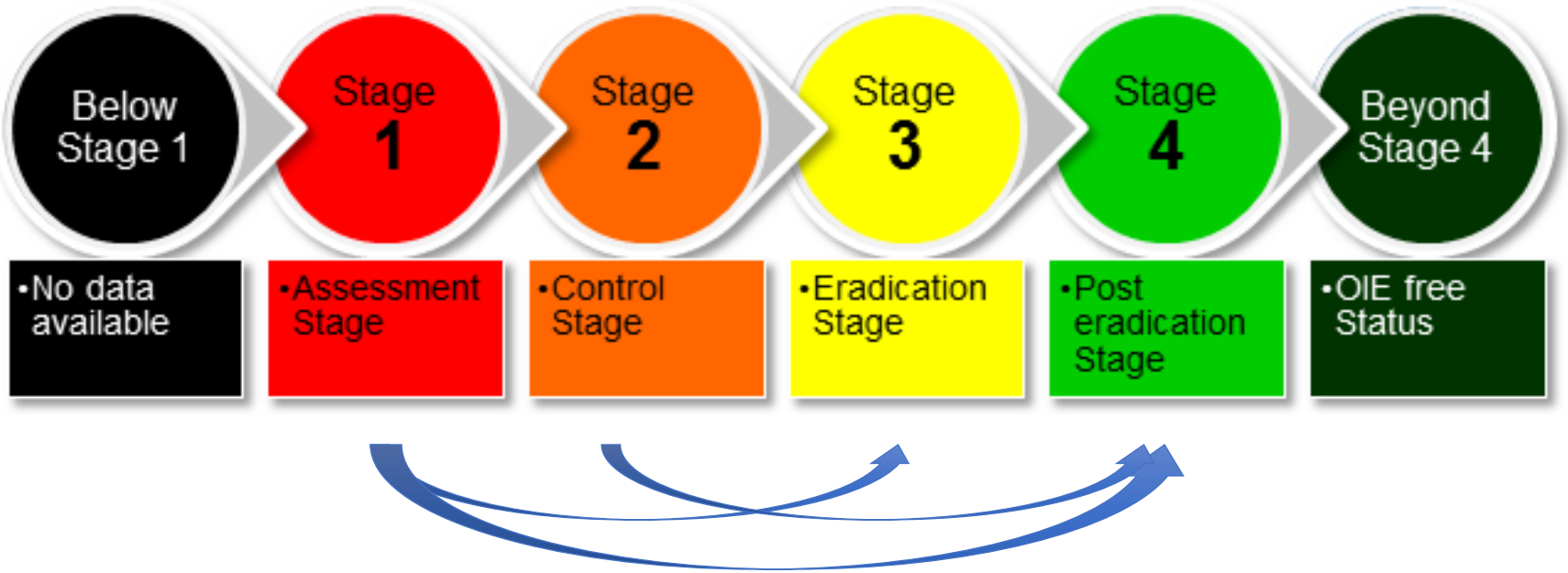
Stage 4 Focus: **TO BUILD EVIDENCE THAT, AFTER SUSPENSION OF VACCINATION, THERE IS NO CLINICAL DISEASE AND NO VIRUS CIRCULATION**

PPR Stepwise approach



A country with an official OIE country status cannot be categorised in any of the 4 Stages (i.e. is 'beyond Stage 4'). A country is entitled to apply to the OIE for such an official free status at the end of Stage 4

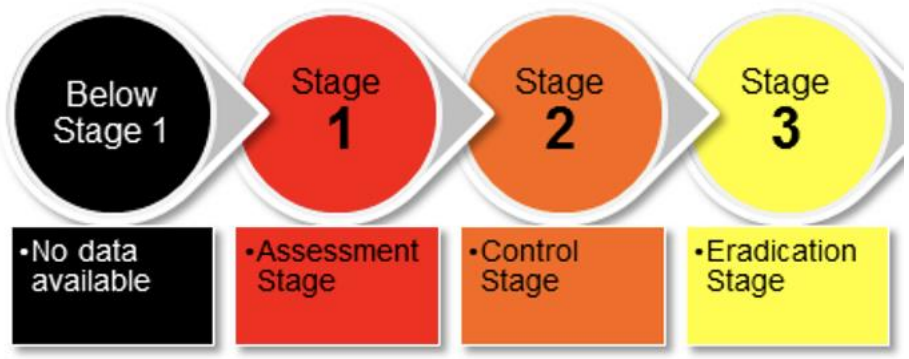
PPR Stepwise approach



Fast-track procedure: the diagram shows the progression across the four Stages and illustrates the possibility, when appropriate investment is made, to move directly forward two or even three Stages.

PPR Stepwise approach

PPR ABSENT



PPR PRESENT

ENDORSEMENT OF NATIONAL CONTROL PROGRAMME


Q1 - Has there been any occurrence of PPR infection in the country the last 25 years or has any vaccination against PPR been carried out during the past 10 years?
NO
The country may be entitled to apply for PPR historical freedom if the rest of the provisions of Article 1.4.6 as well as requirements of Chapter 14.7 of the WOAH Terrestrial Animal Health Code are met
YES
Q2 - Have PPR outbreaks in your country occurred in the past 24 months
YES
Go to PMAT
NO
Q3 - Has vaccination against PPR been practised in the last 24 months?
YES
Go to PMAT
NO
Q4 - is there already robust evidence of no PPR virus circulation for at least the past 24 months?
NO
Before the formulation of the dossier to be submitted to the WOAH to claim PPR freedom evidence of absence of PPRV infection must be built
YES
The formulation of the dossier to apply to the WOAH for the official recognition of PPR free status can be initiated, provided that the provisions of Chapter 14.7 are met

CHAPTER 14.7.

INFECTION WITH PESTE DES PETITS RUMINANTS VIRUS

Article 14.7.3.

Country or zone free from PPR

A country or *zone* may be considered free from PPR when the relevant provisions in point 2 of Article 1.4.6. have been complied with, and when within the proposed free country or *zone* for at least the past 24 months:

1. there has been no *case* of *infection* with PPRV;
2. the *Veterinary Authority* has current knowledge of, and authority over, all domestic sheep and goats in the country or *zone*;
3. appropriate *surveillance* has been implemented in accordance with:
   a. Article 1.4.6. where historical freedom can be demonstrated; or
   b. Articles 14.7.27. to 14.7.33. where historical freedom cannot be demonstrated;
4. measures to prevent the introduction of the *infection* have been in place: in particular, the importations or movements of *commodities* into the country or *zone* have been carried out in accordance with this chapter and other relevant chapters of the *Terrestrial Code*;
5. no *vaccination* against PPR has been carried out;
6. no animals vaccinated against PPR have been introduced since the cessation of *vaccination*.

Chapter 14.7 – Infection with Peste des Petit Ruminants virus

Article 14.7.27.

Introduction to surveillance

Articles 14.7.27. to 14.7.33. define the principles and provide a guide for the *surveillance* of PPR in accordance with Chapter 1.4. applicable to Member Countries seeking recognition of country or zonal freedom from PPR. Guidance is provided for Member Countries seeking reestablishment of freedom following an *outbreak* and for the maintenance of PPR free status.

Surveillance strategies employed for demonstrating freedom from PPR at an acceptable level of confidence should be adapted to the local situation. *Outbreaks* of PPR may vary in severity with differing clinical presentations believed to reflect variations in host resistance and variations in the virulence of the attacking strain. Experience has shown that *surveillance* based on a predefined set of clinical signs (e.g. searching for 'pneumo-enteritis syndrome') increases the sensitivity of the system. In the case of peracute cases the presenting sign may be sudden death. In the case of sub-acute (mild) cases, clinical signs are displayed irregularly and are difficult to detect.

Chapter 14.7 – Infection with Peste des Petit Ruminants virus

Article 14.7.28.

General conditions and methods for surveillance

1. A *surveillance* system in accordance with Chapter 1.4. should be under the responsibility of the *Veterinary Authority*. A procedure should be in place for the rapid collection and transport of samples from suspected *cases* to a *laboratory* for PPR diagnosis.
2. The PPR *surveillance* programme should:
   a. include an *early warning system* throughout the production, marketing and processing chain for reporting suspected *cases*. Farmers and workers who have day-to-day contact with livestock, as well as diagnosticians, should report promptly any suspicion of PPR. They should be supported directly or indirectly (e.g. through private *veterinarians* or *veterinary paraprofessionals*) by government information programmes and the *Veterinary Authority*. All significant epidemiological events consistent with PPR, such as pneumo-enteritis syndrome, should be reported and investigated immediately. Where suspicion cannot be resolved by epidemiological and clinical investigation, samples should be taken and submitted to a *laboratory*. This requires that sampling kits and other equipment be available to those responsible for *surveillance*. Personnel responsible for *surveillance* should be able to call for assistance from a team with expertise in PPR diagnosis and control;
   b. implement, when relevant, regular and frequent clinical inspection and serological testing of high-risk groups of animals, such as those adjacent to a PPRV infected country.

Chapter 14.7 – Infection with Peste des Petit Ruminants virus

Article 14.7.33.

The use and interpretation of serological tests for serosurveillance of PPR

Serological testing is an appropriate tool to use for PPR *surveillance* where *vaccination* has not been practised. There is only one serotype of virus and the tests will detect antibodies elicited by *infection* with all PPRV but the tests cannot discriminate between antibodies against field *infection* and those from *vaccination* with attenuated vaccines. This fact compromises serosurveillance in vaccinated populations and meaningful serosurveillance can only commence once *vaccination* has ceased for several years. Antibodies against virulent and vaccine strains of PPRV can be detected in small ruminants from about 14 days post *infection* or *vaccination* and peak around 30 to 40 days. Antibodies then persist for many years, possibly for life, although titres decline with time.

It is necessary to demonstrate that positive serological results have been adequately investigated.

Chapter 14.7 – Infection with Peste des Petit Ruminants virus

Article 14.7.34.

WOAH endorsed official control programme for PPR

A Member Country may, on a voluntary basis, apply for endorsement of its *official control programme* for PPR in accordance with Chapter 1.6., when it has implemented measures in accordance with this article.

For a Member Country's *official control programme* for PPR to be endorsed by WOAH, the Member Country should provide a detailed *official control programme* for the control and eventual eradication of PPR in the country or *zone*. This document should address and provide documented evidence on the following:

2. *surveillance* and diagnostic capabilities:
   a. PPR *surveillance* in place, in accordance with Chapter 1.4. and Articles 14.7.27. to 14.7.33.;
   b. diagnostic capability and procedures, including regular submission of samples to a *laboratory* that performs diagnostic testing and further characterisation of strains;
   c. serosurveillance conducted in susceptible species, including *wildlife*, to serve as sentinels for PPRV circulation in the country;

Chapter 14.7 – Infection with Peste des Petit Ruminants virus

3. *vaccination*:
   a. *vaccination* is compulsory in the target population and is practised in accordance with Chapter 4.18.;
   b. detailed information on *vaccination* campaigns, in particular:
      i. the strategy that is adopted for the *vaccination* campaign;
      ii. target *populations* for *vaccination*;
      iii. target geographical area for *vaccination*;
      iv. monitoring of *vaccination* coverage, including serological monitoring of population immunity;
      v. the strategy to identify vaccinated animals;
      vi. technical specification of the vaccines used and description of the vaccine licensing procedures in place;
      vii. use of vaccines fully compliant with the standards and methods described in the *Terrestrial Manual*;
      viii. the proposed strategy and work plan including the timeline for transition to the cessation of *vaccination*;

Chapter 14.7 – Infection with Peste des Petit Ruminants virus

4. the measures implemented to prevent the introduction of the pathogenic agent and to ensure the rapid detection of all PPR *outbreaks*;
5. an emergency preparedness plan and an emergency response plan to be implemented in case of PPR *outbreaks*;
6. work plan and timelines of the *official control programme*;
7. performance indicators for assessing the effectiveness of the control measures to be implemented;
8. monitoring, evaluation and review of the *official control programme* to demonstrate the effectiveness of the strategies.

The country will be included in the list of countries having a WOAH endorsed *official control programme* for PPR in accordance with Chapter 1.6.

Retention on the list requires an annual update on the progress of the *official control programme* and information on significant changes concerning the points above.

Thank you for your attention

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