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# *Guidelines for the use of performance indicators in rinderpest surveillance programmes*

*A part of the Global Rinderpest Eradication Programme (GREP)*
*prepared by the*
*Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture*

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## FOREWORD

The IAEA and the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, through their technical co-operation programme and their co-ordinated research project on rinderpest, are supporting national and regional efforts to complete eradication of rinderpest from Africa under the umbrella of the FAO Global Rinderpest Eradication Programme. This support initially focused on monitoring the success of rinderpest vaccination campaigns through the use of the FAO/IAEA rinderpest enzyme linked immunosorbent assay (ELISA). It progressively became more concerned with surveillance to detect possible remaining foci of rinderpest following the cessation of vaccination and with assisting countries in achieving official recognition of freedom from rinderpest. The Office International des Epizooties (OIE) has established the criteria and conditions which must be met in order to qualify for this official recognition. They rely on the presence of functioning national rinderpest surveillance systems able to detect rinderpest if it were present.

The present publication introduces performance indicators as a tool for national authorities to monitor the progress made towards establishing effective rinderpest surveillance programmes.

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*EDITORIAL NOTE*

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## CONTENTS

# 1. INTRODUCTION

This publication will provide practical guidelines for chief veterinary officers (directors of veterinary services, etc.), rinderpest control co-ordinators, sero-surveillance co-ordinators and laboratory directors at national level on the use of performance indicators designed for rinderpest surveillance, as a part of the Global Rinderpest Eradication Programme (GREP).

It aims to guide the reader through a comprehensive indicator system capable of assisting routine monitoring of a national surveillance programme and identifying any deficiencies the programme may possess to prompt appropriate action.

## 1.1. DISEASE PERFORMANCE INDICATORS

Performance indicators provide assurance that a surveillance system, consisting of both active and passive surveillance (refer to Section 2), would be able to detect disease or virus if these were present in a population or country.

Moreover, performance indicators are specifically designed key measures of quality, sensitivity and quantity of a surveillance system, which evaluate whether achievements of a national disease surveillance programme are on target. They comprise time-delimited, denominator-based statistics.

## 1.2. RINDERPEST SPECIFIC PERFORMANCE INDICATORS

Rinderpest specific performance indicators are management tools for countries to objectively measure and assess their ability to detect rinderpest disease or virus. Furthermore, performance indicators would assist GREP countries in demonstrating the presence of statistically valid, passive and active rinderpest disease surveillance capable of rapidly recognizing a disease outbreak.

Indicators are system dependent. Therefore, in order to formulate performance indicators for a rinderpest surveillance system, the objectives and methodologies of the surveillance system must be clearly defined.

All rinderpest surveillance activities, with the exception of sero-surveillance and possibly passive disease reporting, should be targeted to detect and diagnose field outbreaks of stomatitis–enteritis rather than rinderpest. It can be assumed that all countries experience outbreaks of stomatitis–enteritis and therefore should be finding and investigating these outbreaks, if surveillance programmes are *sensitive* (refer to Section 3.1).

# 2. DISEASE SURVEILLANCE IN ERADICATION PROGRAMMES

Disease surveillance is the continuous investigation of a given population to detect occurrence of disease, which would prompt required action. It involves continuous systematic collection, analysis and interpretation of animal health data, which is essential to planning, implementation, and evaluation of animal health systems, closely integrated to their timely dissemination.

The application of surveillance data is essential for prevention and control. A surveillance system requires a functional capacity for data collection, analysis and dissemination.

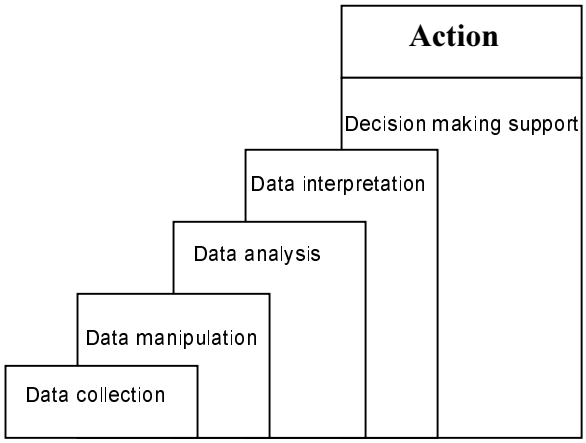



*FIG.1. Application of disease surveillance.*

## 2.1. MAJOR COMPONENTS FOR RINDERPEST SURVEILLANCE SYSTEM

The major components for rinderpest surveillance include the following: passive disease surveillance, active disease reporting, investigation and laboratory diagnosis, active disease search, sero-surveillance and wildlife surveillance.

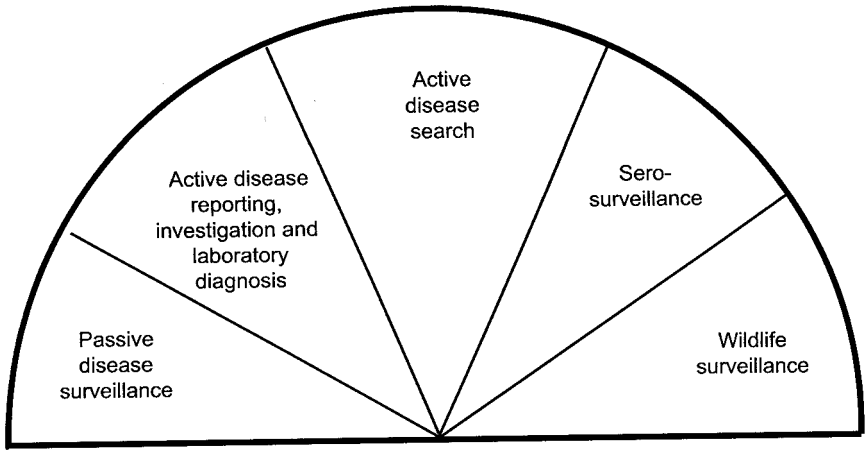



*FIG. 2. Components of a rinderpest surveillance system.*

### 2.1.1. Passive disease surveillance

Passive disease surveillance functions within a routine national disease reporting system. It is a system, which collates monthly reports on significant disease occurrence observed mainly by veterinarians during fieldwork and through communication with livestock owners. Laboratory data generated as a result of routine activities may supplement the reports. Data collected at abattoirs through meat inspection also belong to the passive surveillance system.

Passive disease reporting systems should cover all OIE List A and List B diseases as well as any diseases of local significance.

### 2.1.2. Active surveillance

Active disease surveillance is intended to determine the occurrence of specific clinical syndromes.

*Active disease reporting*

Different groups contribute to a well functioning reporting system including livestock owners, veterinary staff and animal health managers.

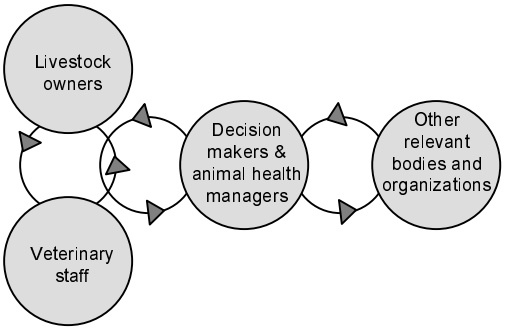



*FIG. 3. Reporting and feedback in an animal disease surveillance system.*

Livestock owners need to be sensitized to report any cases of stomatitis–enteritis. In order to sustain data flow, feedback of results of investigation and testing of reported cases should be supplied back to livestock owners.

Veterinary staff need to be aware of the stomatitis–enteritis case definition, the importance of recording, investigation and sampling.

For managerial and decision making purposes, stomatitis–enteritis occurrence should provide an alert system and allow for prompt response and action.

*Active disease investigation and laboratory diagnosis*

In the framework of a rinderpest eradication programme, the need for sampling of *all* stomatitis–enteritis cases should be emphasized. Additionally, stomatitis–enteritis cases can only be confirmed and ultimately diagnosed through laboratory diagnosis.

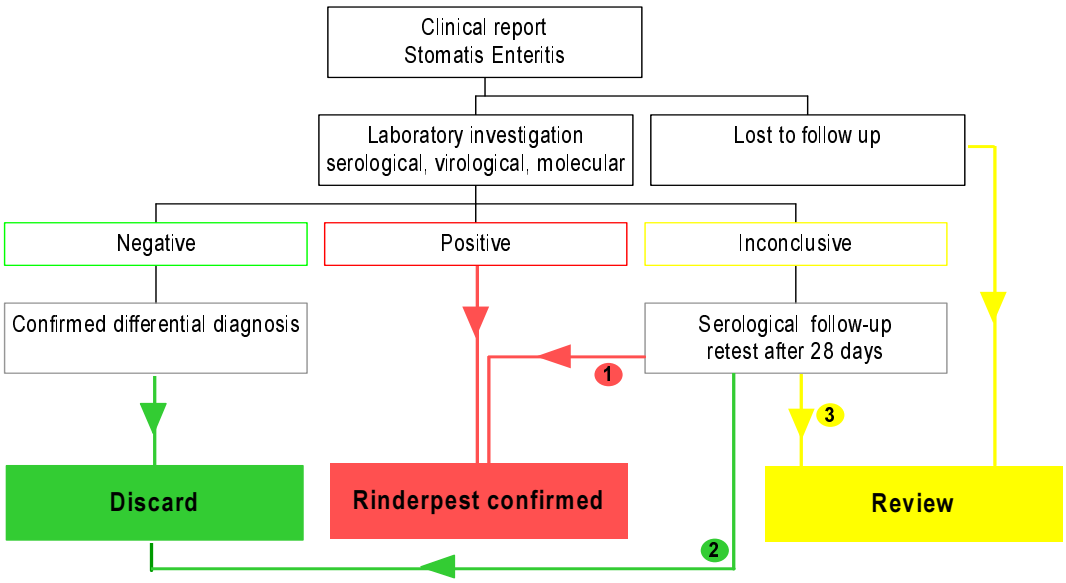
To secure final diagnosis through laboratory testing, staff should be trained to take, handle and dispatch samples appropriately. Reference laboratories play a role in assisting with final diagnosis of new rinderpest outbreaks and in periodic monitoring.

*Active disease search*

In the context of a rinderpest surveillance programme, active surveillance would encompass a search for a syndrome associated with stomatitis and enteritis. Such a surveillance system initiates and maintains field level surveillance with the sole purpose of detecting this clinical syndrome in animal populations. Consequently, active disease surveillance is *not* a search for rinderpest disease, it is a search for clinical syndromes associated with stomatitis and enteritis.

The definitive diagnosis relies on laboratory investigation (Fig. 4).

An event requires reviewing if it has not been definitively diagnosed as either being rinderpest or a confirmed differential disease. A well functioning surveillance system should only have stomatitis–enteritis events in review classification as a transient category.




1 : four-fold increase in titre in identified animals or significant increase in sero-prevalence between two appropriate sample sets
2 : negative or no increase in serological results
3 : equivocal serological results

*FIG. 4. Flowchart to describe response to a stomatitis–enteritis clinical report.*

Stomatitis–enteritis events that are not concluded would indicate a weak point in a surveillance system.

Stomatitis–enteritis syndrome has been defined as including ocular and nasal discharge with any two of the following signs: fever, oral erosions or lesions, excessive salivation, corneal opacity, diarrhoea and death (Fig. 5). Although corneal opacity is not a usual rinderpest sign, it is included in the stomatitis–enteritis complex since this sign has been known to complicate diagnosis. These criteria should be applied at population level rather than at the level of individual animals.

If active disease surveillance is functioning correctly, outbreaks of diseases such as bovine viral diarrhoea (BVD), infectious bovine rhino-tracheitis (IBR) and malignant catarrhal fever (MCF) should be detected, sampled, diagnosed on the basis of confirmatory laboratory results, and reported.

### 2.1.3. Sero-surveillance

Rinderpest sero-surveillance is a means of illustrating the presence of virus in a population by detecting specific antibody to rinderpest virus in serum, however, serological tests do not distinguish between serological response to infection with wild virus or inoculation with vaccine virus. This, therefore, limits the specificity of serological testing (refer to Section 3.2).

However, in populations, which are not vaccinated, sero-surveillance may confirm the absence of rinderpest virus.

### 2.1.4. Wildlife surveillance

Surveillance of wildlife is only applicable to those countries with a significant wildlife population capable of contributing to the maintenance of rinderpest virus. Wildlife would then represent a non-vaccinated sentinel population.

## 3. REAL TIME MONITORING OF SENSITIVITY, SPECIFICITY AND QUALITY OF RINDERPEST SURVEILLANCE

A surveillance system provides a method of *detection, investigation* and *confirmation* of a chain of events that should take place in a *timely* manner. Subsequently, such a system should facilitate a *rapid response.* The purpose of performance indicators is to measure the sensitivity, specificity and timeliness of a national surveillance system.

### 3.1. SENSITIVE

A sensitive surveillance system must be able to *detect* a high percentage of field events that are clinically or epidemiologically compatible with rinderpest.

### 3.2. SPECIFIC

A specific surveillance system must be able to provide a definitive diagnosis for a high percentage of rinderpest-like field events after *investigation*.

### 3.3. TIMELY

The system must be able to detect, diagnose and report results within a time frame that permits prompt field response.

### 3.4. ZERO REPORTING

Apparent lack of a disease, in this case rinderpest, could be either due to the *absence of rinderpest disease* or *ineffective disease surveillance*. Zero reporting distinguishes the two categories by ensuring an active reporting system within which negative reports or reports of the absence of rinderpest compatible outbreaks are documented.

A zero report would imply that a search was conducted but no evidence of rinderpest was found.

### 3.5. RAPID RESPONSE

One of the main objectives of surveillance is to provide sufficient information to decision-makers to decide on appropriate interventions and facilitate rapid response. Rapid response is dependant on a sensitive, specific and timely system.

In the case of a rinderpest emergency, the expected response should be documented in a rinderpest contingency plan where action is considered and detailed in advance and resource requirements are defined and readily available for efficient use.

## 4. PERFORMANCE INDICATORS FOR RINDERPEST IN PRACTICE

Suggestions for performance indicators are provided below (for more detail refer to Appendix I). Since performance indicators are system dependent, these should be adapted and designed to fit the objectives and methodologies of the surveillance system for rinderpest in each country.

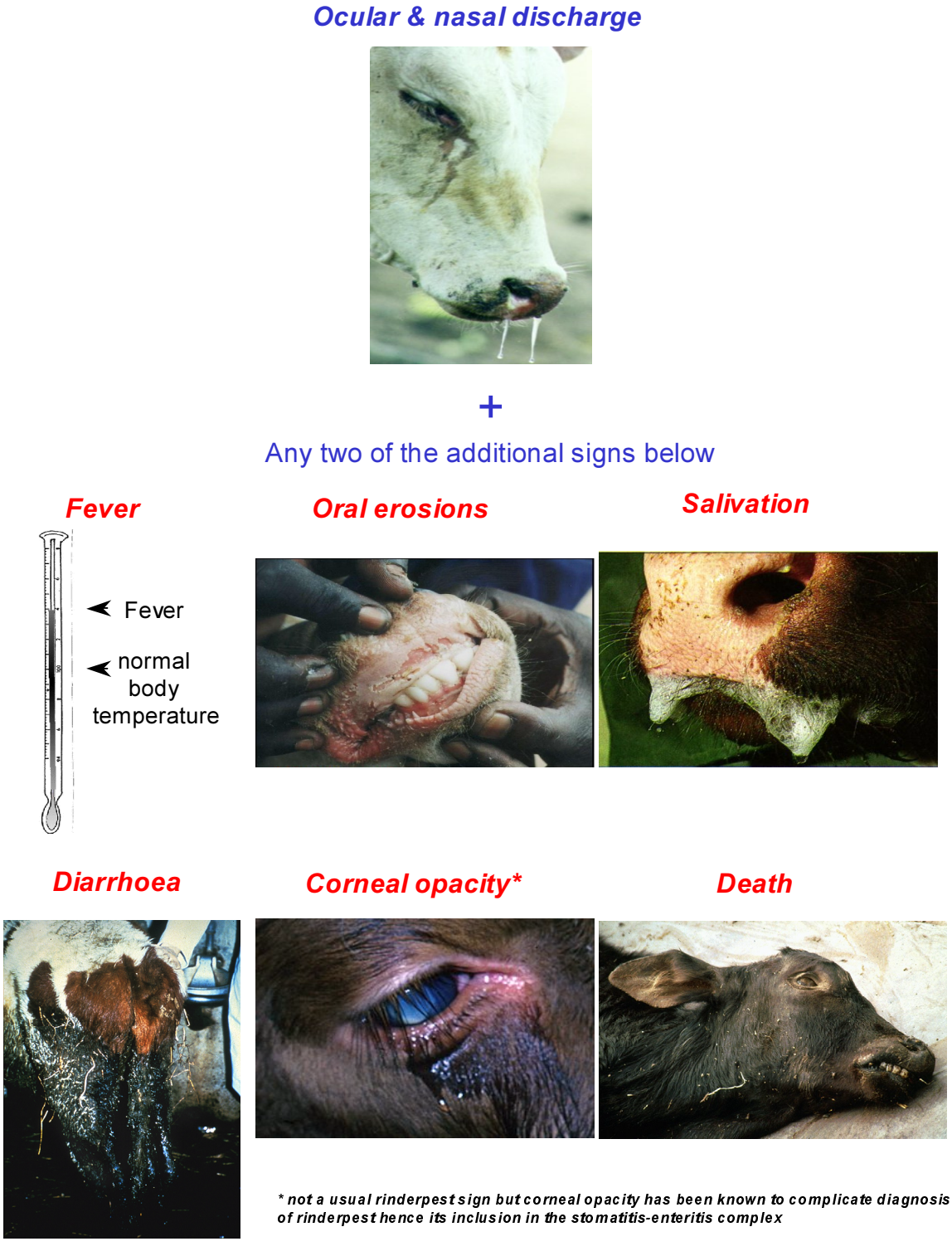



*FIG. 5. Stomatitis–enteritis syndrome.*

Performance indicators should provide tools to assess the sensitivity, specificity and timeliness of the major components of rinderpest disease surveillance. The examples of performance indicators listed below make use of the number of administrative districts, population of susceptible species and numbers of identified population strata for the proportion calculation. The calculations are also assessed subject to time. Two worked examples can be found in Appendix III.

## 4.1. PREREQUISITE CRITERIA

To achieve performance at different levels of the chain of events of surveillance (at sample collection, testing and reporting) and to detect why efficacy and efficiency of a system may be lacking, it is necessary to identify upon which criteria performance is dependant. In identifying the *underlying criteria* it is then possible to diagnose why performance may be below expectation to subsequently allow for remedial action.

Examples of diagnostic indicators that assist in identifying shortcomings in performance, based upon the pre-requisite presence of criteria, are provided in detail in Appendix II.

Furthermore, tangible inputs, e.g. transportation, laboratory equipment, or less tangible inputs like training, are required for a surveillance system to function. These may be summarised in checklists that are critical in the design and evaluation of performance and diagnostic indicators.

## 4.2. SUGGESTIONS FOR PERFORMANCE INDICATORS

Below are eight suggested performance indicators for the evaluation of rinderpest surveillance.

Timeliness, manpower, data quality, effective data analysis and their utilization are common requirements for the implementation of all the performance indicators suggested below. Emphasized with each proposed performance indicator are some additional points that are necessary for performance to be acquired.

The examples of PI 3–7 require accurate estimates of population size in order to draw any reasonable conclusions.

### ➢ PI 1 — Performance indicator for general disease surveillance

Number of districts forwarding general disease reporting forms *within 30 days* at least 10 months of the year per total number of districts.

This indicator relies heavily on:

- the passive surveillance structure, trained staff and materials;
- the capability of districts completing a disease report;
- the postal system or other method of transmission of reports;
- motivation of staff.

### ➢ PI 2 — Performance indicator for active disease search

Number of districts surveyed using active disease search techniques (participatory, questionnaire-based and clinical) with results reported *within 90 days* per total number of districts.

In addition to the basic common requirements mentioned above, active disease search requires the following conditions:

- availability of specialized resources and a recording system;
- strength in the activity chain from data collection to analysis and reporting.

- **PI 3 — Performance indicator for active disease reporting**

Number of reports of stomatitis–enteritis outbreaks received, recorded and forwarded *within 30 days* per 100 000 heads of susceptible species.

This indicator measures the reporting of outbreaks involving one or more animals, and requires the following:

- recorded, noted or at least communicated reports;
- the implementation of the district report recording system.

- **PI 4 — Performance indicator for stomatitis–enteritis outbreak investigation and sample submission to laboratories**

Number of reports of stomatitis–enteritis outbreaks investigated and appropriately sampled by veterinary professionals trained in rinderpest surveillance *within 7 days* of report per 100 000 heads of susceptible species.

The evaluation of stomatitis–enteritis outbreak investigation, involving one or more animals, assuming that all animals involved in an outbreak are sampled, is dependent on the following:

- timeliness of the investigation especially since clinical signs of individual cases normally have a duration of up to 7 days;
- impartial surveillance throughout the country;
- formally documented cases;
- availability of equipment and trained staff;
- Communications reaching livestock owners for a complete cycle of back and forward tracing and link to veterinary services for reporting;
- the timeliness of sample collection in relation to epidemic curve and submission to laboratories.

- **PI 5 — Performance indicator for preliminary rinderpest diagnostic testing**

Number of cases examined by rinderpest antigen, serological, immuno-histopathological and/or RNA detection techniques with preliminary results reported *within 3 days* of receipt of samples per 100 000 heads of susceptible species.

The performance of rinderpest diagnostic testing is based upon:

- availability and implementation of techniques;
- samples reaching the laboratory;
- condition of the sample on arrival;
- suitability of the samples submitted;
- laboratory performing the tests.

- **PI 6 — Performance indicator for stomatitis–enteritis case definitive diagnosis**

Number of stomatitis–enteritis cases diagnosed definitively by laboratory methods at national and/or reference laboratories *within 60 days* of receipt of samples per 100 000 heads of susceptible species (e.g. RP, BVD, MCF, ECF, FMD, etc.).

Definitive diagnostic performance is dependent on:

- capability of establishing differential diagnostic tests;
- number of samples arriving and the time required to reach diagnosis;
- the use of international reference laboratories.

➢ **PI 7 – Performance indicator for sero-surveillance**

Number of serum samples collected and tested with results reported *within 120 days* of collection per total number of populations identified in the country.

The outcome of sero-surveillance relies on:

- quantity and quality of samples collected and submitted;
- timeliness of sample collection, submission, testing and reporting;
- availability of reagents;
- conformation to the random sampling plan and reliability of estimates.

Annual sample sizes should be sufficient to provide 95% probability of detecting evidence of rinderpest if present at a prevalence of *1%* of herds (or other sampling units), and *5% within* herds (or other sampling units).

This can typically be achieved by random sampling of 300 herds in a population, where 15 to 20 animals per herd are tested.

Procedures for sampling should be in accordance with the Guide to Epidemiological Surveillance for Rinderpest published by OIE, 1989, and updated in 1998 or any other procedure that would achieve the same probability of detection.

➢ **PI 8 — Performance indicator for wildlife surveillance (special indicator)**

Number of serum samples collected and tested with results reported *within 90 days* of collection per thousand heads of susceptible species.

This performance indicator is only applicable in countries where wildlife surveillance is appropriate and would be dependent on

- available resources: trained staff, funding;
- samples collected, tested and with definitive diagnosis.

## 4.3. SETTING THE TARGETS IN INDIVIDUAL COUNTRIES

Every country will need to establish expected targets within realistically defined time frames of one to two years, for the performance of their rinderpest surveillance programme.

Actual performance results may then be compared directly to these estimated targets (refer to Appendix I).

This, however, assumes that countries are in possession of data required to draw a valid conclusion on each performance indicator. If data is not available, countries would have to carry out background research or extrapolate from information of other countries with similar conditions to establish realistic estimates before they can implement a system of performance indicators. Basic information regarding for example the estimated occurrences of rinderpest-like diseases such as BVD, MCF, FMD or ECF would be needed.

If targets are established but are not being achieved within a surveillance programme, specific remedial action should be triggered off to strengthen the identified weak link. When

integrated in a surveillance system, performance indicators should be used to direct a system rather than generate additional, frustrating workload for veterinary services.

## 5. HOW COUNTRIES IN GREP CAN USE PERFORMANCE INDICATORS TO SUPPORT THEIR APPLICATION TO OIE FOR RECOGNITION OF FREEDOM FROM RINDERPEST

Countries progressing along the OIE pathway from 'provisional freedom from rinderpest' through 'freedom from rinderpest disease' and finally to 'freedom from rinderpest infection' shall be required to demonstrate the presence of a well functioning veterinary service and provide details of their disease surveillance and reporting system. These are detailed in 'Recommended Standards For Epidemiological Surveillance Systems For Rinderpest' which was adopted by the International Committee of the OIE in May 1998 (Fig. 6).

Countries may use the concept of performance indicators to provide evidence and documentation to the OIE for official international recognition of freedom-from-rinderpest in order to benefit from increased access to international export markets for livestock and livestock products.

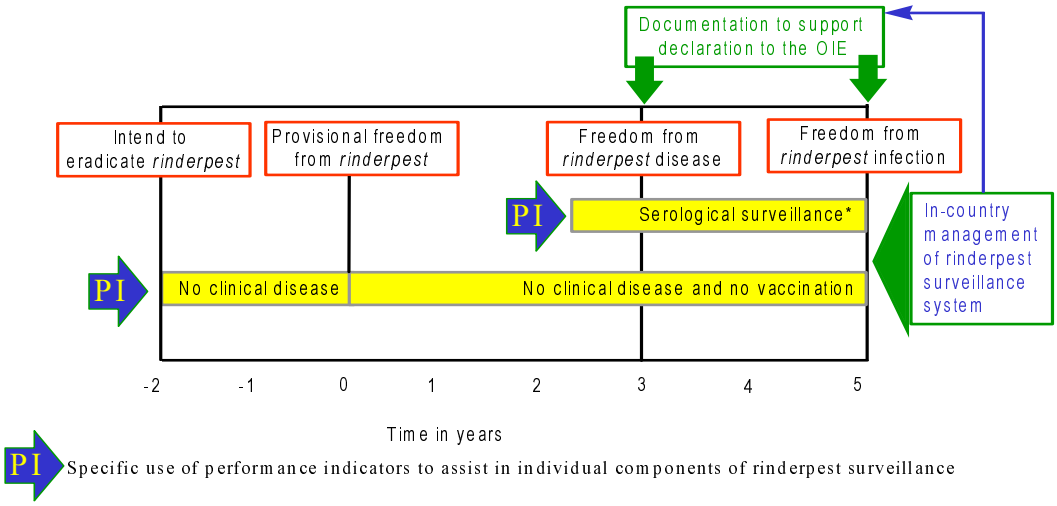



*FIG. 6. The OIE pathway and the relevance of performance indicators.*

## 6. CONCLUSION

The concept of performance indicators should provide countries with a management tool to assist in operating their disease surveillance systems efficiently and effectively but the implementation of performance indicators requires a functional capacity for data collection, analysis and dissemination.

The use of performance indicators should assist countries in verifying freedom from rinderpest in order to proceed efficiently along the OIE Pathway. Thereby, countries will be able to take advantage of potentially lucrative trade opportunities by credibly demonstrating the capability to declare freedom from rinderpest disease and/or infection to the OIE and GREP.

## Appendix I

## EXAMPLES OF PERFORMANCE INDICATORS FOR RINDERPEST AND THEIR APPLICATION

| TITLE | PERFORMANCE INDICATOR | PERFORMANCE INDICATOR CALCULATION | TIME | INPUT DATA | TARGET |
|---|---|---|---|---|---|
| 1. General disease surveillance | Number of districts forwarding general disease reporting forms within 30 days ***at least 10 months*** of the year per total number of districts. | No. of districts forwarding **general disease reports** × 100%<br>Total no. of districts. | 30 days | District<br>Reporting month<br>Date of receipt of report<br>Number of districts in country | 80% |
| 2. Active disease search | Number of districts surveyed using ***active disease search techniques (participatory, questionnaire-based and clinical) with results reported*** within 90 days per total number of districts. | **No. of districts reporting results** × 100%<br>Total no. of districts | 90 days | District<br>Date of survey<br>Date of receipt of report<br>Number of districts in country | 10–20% |
| 3. Active disease reporting | Number of reports of stomatitis–enteritis ***received, recorded and forwarded*** within 30 days per 100 000 heads of susceptible species. | **No. of reports of stomatitis–enteritis** × 100 000<br>Total no. of susceptible species | 30 days | Number of reports received, recorded and forwarded<br>Susceptible population | Reporting rate |
| 4. Stomatitis–enteritis outbreak investigation | Number of reports of stomatitis–enteritis ***investigated and appropriately sampled*** by a veterinary professional trained in rinderpest surveillance within 7 days of report per 100 000 heads of susceptible species. | **No. of reports of stomatitis–enteritis** × 100 000<br>Total no. of susceptible species | 7 days | Date of receipt of outbreak report<br>Date of investigation<br>Susceptible population | An estimate of the outbreak occurrence of rinderpest-like diseases |
| 5. Preliminary Rinderpest Diagnostic Testing | Number of cases ***examined by rinderpest antigen, serological, immuno-histopathological and/or RNA detection techniques*** with preliminary results reported within 3 days of receipt of samples per 100 000 heads of susceptible species. | **No. of lab examined cases** × 100 000<br>Total no. of susceptible species | 3 days | Date of sample submission<br>Date of preliminary rinderpest<br>Result report<br>Number of cases tested<br>Susceptible population | |

| TITLE | PERFORMANCE INDICATOR | PERFORMANCE INDICATOR CALCULATION | TIME | INPUT DATA | TARGET |
|---|---|---|---|---|---|
| 6. Stomatitis–Enteritis Case Definitive Diagnosis | Number of stomatitis–enteritis cases diagnosed ***definitively*** by laboratory methods at national and/or reference laboratories within 60 days of receipt of samples per 100 000 heads of susceptible species (e.g. RP, BVD, MCF, ECF, FMD, etc.). | **No. of lab diagnosed stomatitis–enteritis cases** × 100 000<br>Total no. of susceptible species | 60 days | Date of sample submission<br>Date of definitive result report<br>Number of cases tested<br>Susceptible population | An estimate of the case occurrence of rinderpest-like diseases |
| 7. Sero-surveillance | Number of ***serum samples collected and tested with results reported*** within 120 days of collection per total number of strata identified in the country. | **No. of serum samples**<br>Total no. identified strata | 120 days | Date of sample set collection<br>Date of survey report<br>Number of samples collected, tested and reported<br>Number of strata defined | 4500 (if based upon min. 15 samples collected at 300 different herds)* |
| 8. Wildlife Surveillance (special indicator) | Number of ***serum samples collected and tested with results reported*** within 90 days of collection per thousand heads of susceptible species. | **No. of serum samples** ×1000<br>Estimate of susceptible wildlife population | 90 days | Date of sample collection<br>Date of report<br>Estimate of susceptible population | |

* Refer to:
Recommended Standards for Epidemiological Surveillance Systems for Rinderpest; OIE (1989, 1998), and
Recommended Procedures for Disease and Serological Surveillance as Part of the Global Rinderpest Eradication Programme (GREP), FAO/IAEA (1994), IAEA-TECDOC-747.

## Appendix II
## EXAMPLES OF DIAGNOSTIC INDICATORS FOR ASSESSING PERFORMANCE OF A SURVEILLANCE SYSTEM

| PERFORMANCE INDICATOR | DIAGNOSTIC INDICATORS (DI) |
|---|---|
| 1. Number of districts forwarding general disease reporting formats within 30 days of the end of the month at least 10 months of the year per total number of districts. | Percentage of districts that have functional veterinary infrastructure.<br>Percentage of districts that have a trained reporting agent.<br>Percentage of districts that have been supplied with reporting formats during the last two years.<br>Percentage of districts that have filed at least one disease reporting format correctly during the year.<br>Percentage of districts that have filed incorrectly completed disease-reporting formats during the year.<br>Percentage of districts that have filed general disease occurrence reports using non-standard formats or through non-standard channels.<br>Number of summary reports, newsletters or bulletins on animal disease statistics prepared and distributed to the OIE, decision-makers and surveillance system participants within 30 days of the completion of the reporting period. |
| 2. Number of districts surveyed using active disease search techniques (participatory, questionnaire-based and clinical) with results reported within 90 days per total number of districts. | Has an active disease search procedure/methodology been developed?<br>Number of staff trained to carry out active disease surveillance over the last three years per total number of districts.<br>Percentage of districts for which data collection was completed during the year per total number of districts.<br>Number of surveys analysed and reported during the year per number of surveys undertaken.<br>Number of completed surveys judged to be reliably collected and analysed per number of surveys undertaken.<br>Number of summary or national reports providing an overview of data and information obtained by active disease search programmes during the year. |
| 3. Number of reports of stomatitis–enteritis received, recorded and forwarded within 30 days per 100 000 heads of susceptible species. | Number of reports of stomatitis–enteritis received by all channels per 100 000 heads of susceptible species during the year.<br>Percentage of districts/offices with up-to-date report registries.<br>Number of reporting formats forwarded within 30 days to the national co-ordination office per total number of reporting formats received.<br>Number of stomatitis enteritis outbreaks reported to the national co-ordination office using reporting formats per total number of reports received by all channels during the year.<br>Percentage of districts forwarding reporting formats (zero or outbreak reports) at least 10 months out of the year.<br>Number of man-days dedicated to active field search and farmer contact specifically related to stomatitis–enteritis surveillance during the year per 100 000 heads of susceptible species. |

| PERFORMANCE INDICATOR | DIAGNOSTIC INDICATORS (DI) |
|---|---|
| 4. Number of reports of stomatitis–enteritis investigated and appropriately sampled by a veterinary professional trained in rinderpest surveillance within seven days of report per 100 000 heads of susceptible species. | Number of reports investigated by a staff member trained in rinderpest surveillance per 100 000 heads of susceptible species.<br>Average number of days between receipt of report and outbreak investigations for all outbreak investigation undertaken during the current year.<br>Percentage of provinces/regions/states that have undertaken investigations.<br>Percentage of stomatitis–enteritis outbreaks incorrectly diagnosed based on the criteria of the stomatitis–enteritis case definition per total number of stomatitis–enteritis reports investigated.<br>Percentage of investigations leading to the detection and clinical diagnosis of cases meeting the stomatitis–enteritis case definition during the year.<br>Number of stomatitis–enteritis cases detected annually per 100 000 heads of susceptible species.<br>Percentage of districts/offices with sampling materials.<br>Percentage of districts/offices with staff trained in appropriate sample collection techniques.<br>Percentage of cases sampled at the time of detection (initial investigation) per total number of cases detected.<br>Average number of days between detection of cases and case sampling for all cases sampled during the year.<br>Percentage of cases never sampled per total number of cases detected. |
| 5. Number of cases examined by rinderpest antigen, serological, immuno-histopathological and/or RNA detection techniques with preliminary results reported within three days of receipt of samples per 100 000 heads of susceptible species | List of diagnostic techniques available and fully operational.<br>Number of case samples received for stomatitis–enteritis investigation annually per 100 000 heads of susceptible species.<br>Percentage of case samples received in reliable condition (adequate cold chain, labelling, etc.).<br>Percentage of case samples received that include appropriate samples (e.g. correct type and timing of sampling).<br>Average number of days elapsed between the receipt of samples and the reporting of results.<br>Percentage of case samples for which results are not obtained or reported. |
| 6. Number of stomatitis–enteritis cases identified definitively by laboratory methods at national and/or reference laboratories within 60 days of receipt of samples per 100 000 heads of susceptible species (e.g. RP, BVD, MCF, ECF, etc.). | List rinderpest and differential diagnostic techniques available nationally. List rinderpest and differential diagnostic techniques available regionally. List rinderpest and differential diagnostic techniques available at the world reference laboratory.<br>Number of case samples received for stomatitis-enteritis investigation per100 000 heads of susceptible species during the year.<br>Average number of days between receipt of samples and definitive diagnosis for all samples received.<br>Number of stomatitis–enteritis cases definitively identified as rinderpest.<br>Number of stomatitis–enteritis cases definitively identified as not due to rinderpest by identification of another causal agent (BVD, IBR, MCF, ECF, FMD, etc.).<br>Number of stomatitis–enteritis cases definitively diagnosed as not due to rinderpest by secondary serological investigation.<br>Number of rinderpest-compatible cases that remained unidentified at year-end.<br>Number of rinderpest-compatible cases that were forwarded to reference laboratories for further investigation |

| PERFORMANCE INDICATOR | DIAGNOSTIC INDICATORS (DI) |
|---|---|
| 7. Number of serum samples collected and tested with results reported within 120 days of collection per number of strata identified. | Percentage of strata for which reliable samples were collected out of the total number of strata identified in the country.<br>Total number of serum samples collected per total number of strata.<br>Total number of serum samples forwarded to the sero-surveillance laboratory within 120 days of collection per total number of strata.<br>Total number of serum samples received by the laboratory in reliable condition with supporting data per total number of strata.<br>Quantity of reagents available expressed in number of sera that could be tested per total number of strata.<br>Total number of serum samples tested within 120 days of receipt by the laboratory per total number of strata.<br>Total number of serum samples tested with results reported within three days of receipt by the laboratory per total number of strata.<br>Percentage of sampling sites successfully sampled per total number of sites defined in the annual random sampling plan. |
| 8. Number of serum samples collected and tested with results reported within 90 days of collection per thousand heads of highly or moderately susceptible species. | Number of staff trained and equipped to immobilise wildlife for the purpose of sample collection per thousand heads of highly or moderately susceptible species<br>Amount of funding available for wildlife surveillance per thousand heads of highly or moderately susceptible species.<br>Number of serum samples collected per thousand heads of highly or moderately susceptible species.<br>Number of serum samples tested per thousand heads of highly or moderately susceptible species.<br>Number of serum samples for which results were reported per thousand heads of highly or moderately susceptible species. |

## Appendix III
## EXAMPLE OF PERFORMANCE INDICATORS

### Example 1: PI 1 — Performance indicator for general disease surveillance

Country X has a total of 50 districts. Four hundred and twenty reports were filed in a year for the whole country. Fifteen districts forwarded general disease reports for at least 10 months of the year but only 12 of them reported within 30 days from the end of the month being reported, while 35 districts forwarded less than 10 reports

PI 1: Number of districts forwarding general disease reporting formats within 30 days at least 10 months of the year per total number of districts.

**Calculation PI 1** = 12/50 × 100% = **24%** ***(target 80%)***

### Diagnosing why performance is low

| | | |
|---|---|---|
| Percentage of districts that have functional veterinary infrastructure. | $\frac{15}{50} \times 100 = 30\%$ | Limited infra-structure to sustain routine veterinary field work |
| Percentage of districts that have a trained reporting agent | $\frac{37}{50} \times 100 = 74\%$ | |
| Percentage of districts that have been supplied with reporting formats during the last two years. | $\frac{50}{50} \times 100 = 100\%$ | |
| Percentage of districts that have filed at least one disease reporting format correctly during the year. | $\frac{48}{50} \times 100 = 96\%$ | |
| Percentage of districts that have filed incorrectly completed disease-reporting formats during the year. | $\frac{2}{50} \times 100 = 4\ \%$ | |
| Percentage of districts that have filed general disease occurrence reports using non-standard formats or through non-standard channels. | $\frac{2}{50} \times 100 = 4\%$ | |
| Number of summary reports, newsletters or bulletins on animal disease statistics prepared and distributed to the OIE, decision-makers and surveillance system participants within 60 days of the completion of the reporting period. | 0 | No feedback. Minimized use of data. Low incentive and motivation |

**Possible interpretation:** The low performance may be attributable to the lack of veterinary infrastructure to perform daily fieldwork, which is made more severe, by the lack of motivated staff. Additionally, the diagnostic indicators suggest the availability of trained staff and standard forms but a possible lack of resources to transfer the report from district to national level in a timely manner.

**Remedial action:** Invest in veterinary infrastructure. Facilitate and provide means of form submission from districts to national offices. Enhance motivation of staff by supply of feedback.

**Example 2: PI 5 — Performance indicator for preliminary rinderpest diagnostic testing**

Country X has 2 stomatitis–enteritis cases diagnosed definitively by the laboratory within 3 days of receipt of samples. Their total unstratified cattle population is 3 000 000. Both AGID and immunocapture ELISA are carried out in the laboratory.

Number of cases examined by rinderpest antigen, serological, immuno-histopathological and/or RNA detection techniques with preliminary results reported within 3 days of receipt of samples per 100 000 heads of susceptible species.

**Calculation PI 5** = 2/3 000 000 × 100 000 = 0.0067 ***(target would be the estimated number of stomatitis–enteritis cases to be expected in the country population per 100 000 heads of susceptible species)***

**Diagnosing why performance is low**

| | | |
|---|---|---|
| List diagnostic techniques available and fully operational. | AGID, immunocapture ELISA | |
| Number of case samples received for stomatitis–enteritis investigation annually per *100 000*, heads of susceptible species. | unknown | expected estimate of disease occurrence |
| Percentage of case samples received in reliable condition (adequate cold chain, labelling, etc.). | unknown | possible target >80% |
| Percentage of case samples received that include appropriate samples (e.g. correct type and timing of sampling). | unknown | possible target >80% |
| Average number of days elapsed between the receipt of samples and the reporting of results. | unknown | possible target <3 days |
| Percentage of case samples for which results are not obtained or reported. | unknown | possible target 0 |

**Interpretation:** Specialized and formalized system for test and laboratory data management is insufficient although laboratory know-how and tests are available.

**Remedial action:** Introduce systematic recording methods — manual or computerized, for storage of data and follow up.

## ABBREVIATIONS

| | |
|---|---|
| BVD | bovine viral diarrhoea |
| ECF | East Coast fever |
| ELISA | enzyme linked immunosorbent assay |
| FMD | foot-and-mouth disease |
| MCF | malignant catarrh fever |
| PI | performance indicator |
| RP | rinderpest |

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