



## Basic epidemiology

*Blagojcho Tabakovski DVM, Head of Unit for Animal Health*



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- Farm level
- Tools

## Definition

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- **Epidemiology**  
the branch of medicine dealing with the incidence and prevalence of disease in large populations and with detection of the source and cause of [epidemics](#) of infectious disease (dictionary)
- is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems. Various methods can be used to carry out epidemiological investigations: surveillance and descriptive studies can be used to study distribution; analytical studies are used to study determinants. (WHO)
- **Epidemiological unit** means a group of animals with a defined epidemiological relationship that share approximately the same likelihood of exposure to a pathogen. This may be because they share a common environment (e.g. animals in a pen), or because of common management practices. Usually, this is a herd or a flock. However, an epidemiological unit may also refer to groups such as animals belonging to residents of a village, or animals sharing a communal animal handling facility. The epidemiological relationship may differ from disease to disease, or even strain to strain of the pathogen (OIE)

## Republic of Macedonia

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## Territorial organization

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Skopje, 13-14 September 2017

## Animal population and density

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region	cattle	sheep	goat	total
Skopje	20649	37239	4061	61949
North East	29546	59089	11354	99989
East	50004	182839	30465	263308
Vardar	16949	80033	10303	107285
Pelagonija	48437	126303	6415	181155
South West	16057	101887	7346	125290
Polog	31936	102548	4184	138668
Total	213578	689938	74128	977644



cattle



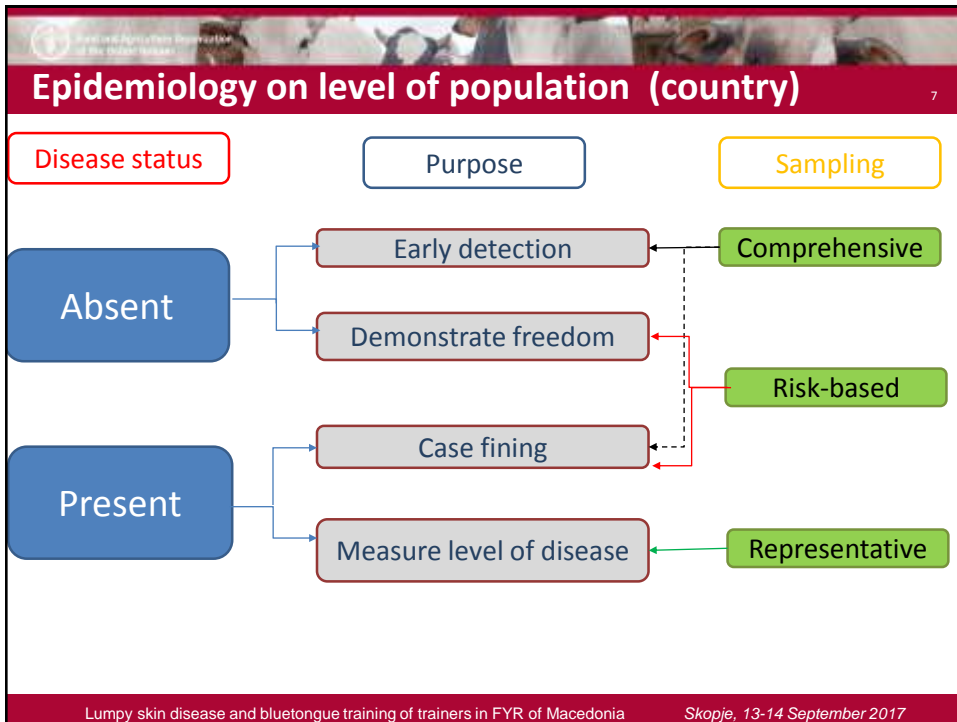
sheep



goats

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- ## Principles of disease control
1. **Stop production of virus**-slaughter infected and susceptible animals on farm
  2. **Prevent spread**-trace all movements from & contacts with the farm that may have spread disease
  3. **Look for source of disease** - back trace movements/contacts onto farm
  4. **Surveillance**
  5. **Understand outbreak** and impose appropriate additional control measures (? vaccination, enhanced biosecurity)
- ### ROLES FOR THE EPIDEMIOLOGIST
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When was infection introduced to the farm?

Where did infection come from?

Where may infection have been spread to?

- Host
- Direct Contact between animals
- Animal products (milk, meat)
- Mechanical/fomites
- Wind
- Vectors
- Wild animals
- Environment
- Epidemiological unit
- Illegal movement

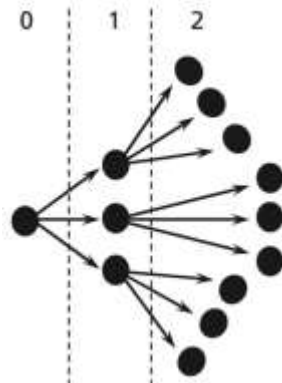
## Reproduction number

11

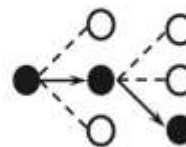
- Basic reproduction number ( $R_0$ ):
  - The average number of secondary cases caused by one case in a naïve population
  - FMD: estimated to vary between 2 and >70
- $R_0$  for LSD 15.6
- $R_0$  for BT 16 - 22
- 100% effective vaccination:
 
$$1 - 1/R_0$$

## Reproduction number - examples

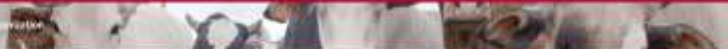
12



$R_0 = 3$



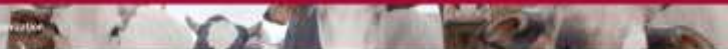
$R_n = 1$



## BT and LSD characteristics

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- Contagious
- Vector borne
- Other transmission
- Population
- Subclinical cases
- Traditional husbandry in the country
- Surroundings
- Incubation period
- Others



## Outbreak investigation

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- Is it BT or LSD (other disease)
- Epidemiological form (is it enough?)
- Questions (where, when, how, spared)
- Affected units (number of animals) contact holdings (investigate)
- Set the priorities
- Epidemiological unit

- Outbreak is stressful for everyone
- Establish trust
- Be patient
- Keep an open mind
- Listen to what the farmer and his staff says
- Explain yourself and answer any questions they have
- Remember – farmers talk to each other

**Questions**  
**Thanks for your attention**