



## IMPACT OF LIVESTOCK MIGRATION ON DISTRIBUTION OF BRUCELLA MELITENSIS IN SOUTHERN ALBANIA PASTURE

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### SYNOPSIS

#### Key words:

*Brucella melitensis*,  
brucellosis,  
Infective disease,  
pastures,  
contamination.

Brucellosis is an infectious disease that affects animals and humans, which is caused by Brucella bacteria group. The cause of the spread of this disease are contaminated pastures, water or uncontrolled movement of livestock. Albania is also included among the countries with considerable brucellar endemic infection spread almost throughout the whole territory.

In the last 10 years, from 1999 to 2009 in the area of Korça, the number of affected livestock from brucellosis is 10275. The number of hot spores with brucellosis varies from 16 to 100.

Contamination of pastures has come as a result of low interest of farmers to respect the rules of hygiene, sanitation and uncontrolled movements of livestock.

### INTRODUCTION

*Brucella melitensis* infection is recognized as a significant public health challenge, with a major economic and financial burden in countries where the disease remains endemic, there is in general a positive correlation between the level of *B. melitensis* infection in small ruminants and the number of infections in humans (Benkirane, 2000; Al-Talafhah et al.; 2003). Humans are usually infected with the organism through contact or through ingestion of contaminated milk or dairy products. Control of the disease in animals is a pre-requisite to reducing its burden on public health (Moreno et al., 2002).

*Brucella melitensis* is one of the six species that causes brucellosis, which can be described as a fatal zoonotic disease that affects multiple body systems. *B. melitensis* was originally found as a pathogen that mainly affected goats and sheep,

which caused a decrease in fertility, loss of young, and a decrease in milk production. However, there has been more recent cases where this species has also been a highly pathogenic cause of human brucellosis (Al-Talafhah et al., 2003).

Brucellosis disease is progressing rapidly in Albania too, not only by widely spreading among the cattle, but also by seriously endangering human health. Specialists also say that animals with brucellosis have been identified in about 75 percent of the territory. Hotbeds of brucellosis have now passed from the problematic areas, like Gjirokaster and Permet to Korça even from the South to the North (Puto & Shkurti, 2008).

Therefore, the object of study are the brucellas that had been circulating in the Region of Korça during the years 1999-2009. Due to the fact that this disease is of double importance, in the health and economic aspect, in this study we are going to analyse: the dynamics of the spread of brucellas in the southeastern region of Albania.

The goal is: impact of the spread of brucellosis in the Korça Region for the years under study 1999-2009, analysing the following:

- The spread of brucellosis among the cattle.
- The geographical spread of brucellosis in the Korça region.
- The hotbeds of animals infected with brucellosis
- The searches in animals.
- Brucellination and vaccination
- Veterinary and hygienic-sanitary measures for the elimination of brucellosis in the future.

Some of the weak points causing this disease in animals are:

- The growing tendency of the number of brucellosis-infected cattle
- The uncontrolled movements of animals within the country and abroad
- The lack of circulation of brucellosis contaminated pastures and their control
- The poor care during the manipulation of animals by cattlemen
- 100% delayed disposals of infected animals
- The delayed vaccination of animals
- The processing of milk and its by-products in household conditions, without proper standards.
- The low health culture among the community

The Mediterranean countries and the Middle East have an annual incidence of human brucellosis of 1-78 cases per 100 thousand inhabitants. Europe has an annual occurrence of 400 cases per 100 thousand inhabitants (Al-Talafhah et al., 2003; Benkirane, 2000; Redkar et al., 2001). Even in the district of Korça, this occurrence, for the years under study, varies from 5.9% to 11.9% or from 50 cases to 262 cases in the year 2004 per 100 000 inhabitants. This is the consequence of the great number of cases among sheep and goats, which for the 10 years taken for study, 10280 cases resulted to be positive with brucellosis. The figure below (figure

1) reflects the spread of brucellosis in Europe during the year 2009, where Albania seems to be among endemic countries regarding this disease (Sauret & Vilissova, 2002).

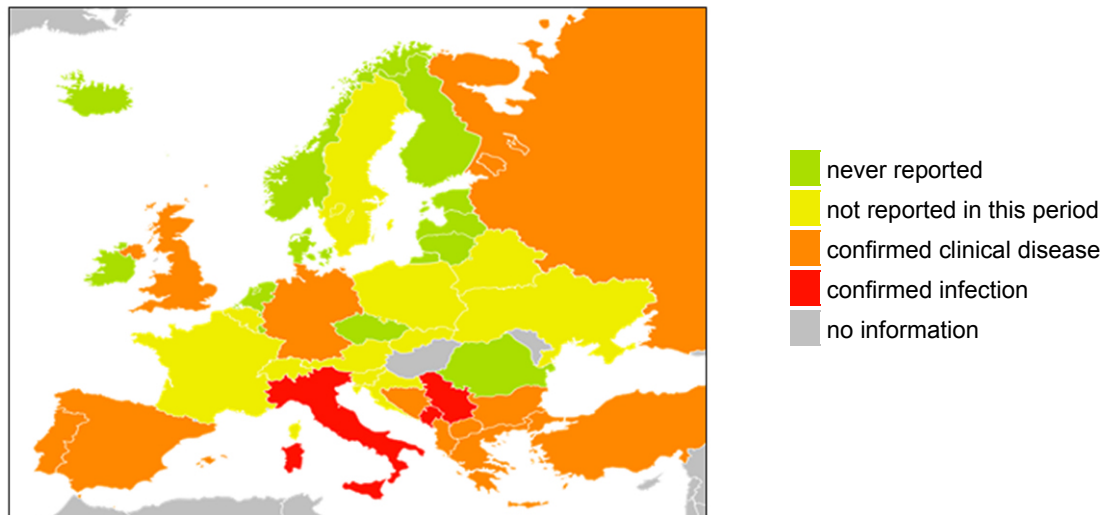


Figure 1: The spread of *Brucella melitensis* in Europe during the year 2006.

#### BRUCELOSIS IN ALBANIA

The epidemiological survey of brucellosis becomes especially important for the endemic countries, which Albania is a part of. Initially, the first hotbed in Albania was recorded in Gjirokaster (where the first case with brucellosis in the year 1925 had also been identified), but later it was also spread to Korçë and Kolonjë.

Meanwhile, in the recent years cases have been identified and brucellosis has begun to spread to Librazhd, Elbasan Dibër, Kukës, even to Tropojë. Only the North-Western region of the country has not been yet touched by brucellosis. But more dramatic to the specialists remains the fact that brucellosis is now found in considerable numbers not only in animals, but also in humans, thus posing a serious risk to their health (Puto & Shkurti, 2008).

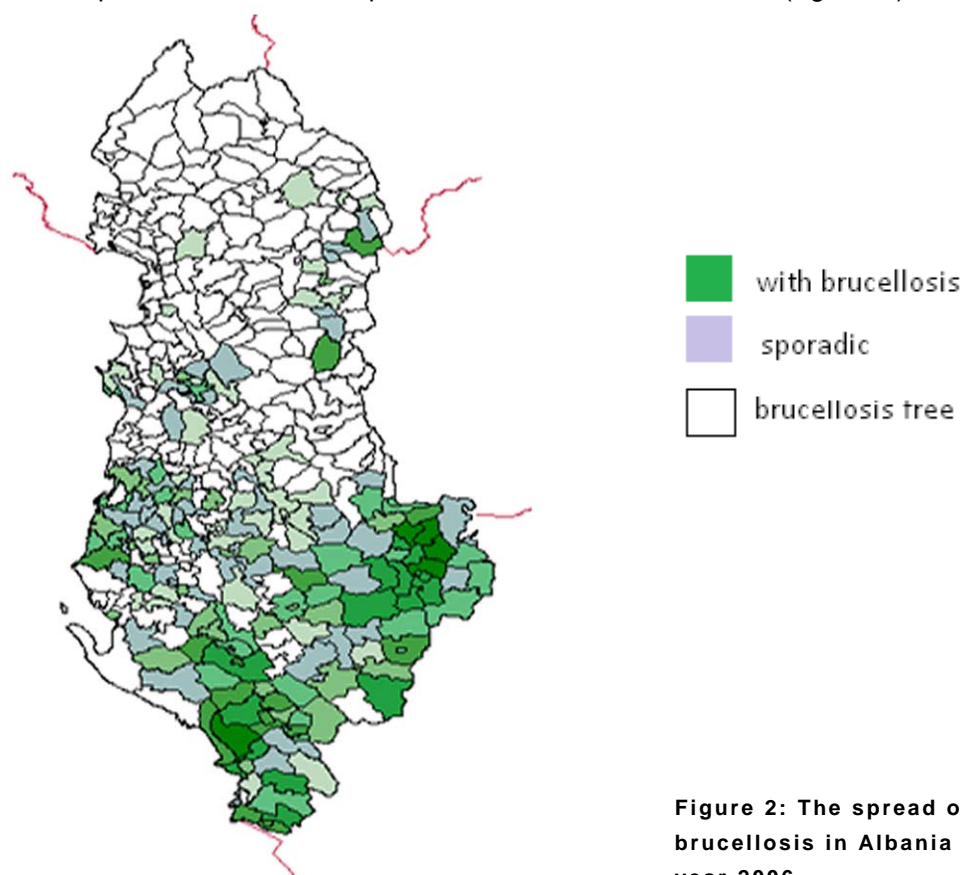
At present, the most problematic in our country is the brucellosis of the livestock caused by *B. melitensis*, which is transmittable to humans as well. According to medical and veterinary sources, brucellosis in Albania is now one of the most dangerous diseases to people and animals.

Before the year 1990, our country had been pronounced to be immuned from brucellosis.

As for the above, it results that regarding the period before the years 90', infection reached its culminate spread in the years 1960-1965. Due to measures taken, infection gradually decreased to such a level that the country was considered as immuned from this infection in the year 1987 (Babameto, 1957; Dodbiba & Telo, 1966).

During this period, brucellination, the elimination of positive animals, was successfully used, vaccine having played a significant role in it. This vaccine was used on a wide scale after the years 60' and its combination with tracing helped yield evident results.

In the year 1988, Albania was pronounced as immuned from brucellosis, but after the economic-political changes of the years 1990, brucellar infection reappeared and increased rapidly for the very fact that during this period the technical structure of the domination of this disease was destroyed (Puto & Shkurti, 2008). The map below shows the spread of brucellosis in Albania (figure 2).



**Figure 2: The spread of brucellosis in Albania in the year 2006.**

Figure 2 shows that brucellar infection is not only present in the south of the country, but for the 10-year period covered by our study, this disease has also started to spread in the north of the country: Peshkopi, Shkodër etc.

#### **GENERAL CHARACTERISTICS OF BRUCELLAS**

**MORPHOLOGY.** *Brucella* is a Gram-negative, coccobacilli pathogenic bacteria that adapts to an intracellular lifestyle, it is non-spore-forming and non-motile in dimensions 0.6 – 1.5 micron in length and 0.5-0.7 micron in width. These organisms are mainly aerobic, but some may require an atmosphere containing about 5-10% of

carbon dioxide. The growth of the *Brucella* species is slow, sometimes taking as long as 2-3 days and an enriched medium is needed for optimal growth at 37°C (Andoni, 1983; Andoni & Jocaj, 2000; Moreno et al., 2002; Şahin et al., 2004).

*Brucella melitensis* mainly interacts with animals such as goat and sheep in domestic or wild animal reservoirs. Infectious food-borne diseases usually result in humans when contaminated or poorly pasteurized or unpasteurized milk and cheese products are consumed because of the ability for the organism to colonize in the udder of animals. These organisms thrive in the phagocyte cells of its host.

Their stability varies in environments of various conditions. In all the habitats, where animals graze or stay, brucellas spread easily and become a source of infection to uninfected animals, as well as to humans (table 1) (Al-Talafhah et al., 2003; Şahin et al., 2004).

**Table 1: The stability of brucellas in various environment conditions.**

ENVIRONMENT	CONDITIONS	STABILITY
Sun rays	< 31°C	4.5 hours
Water	4° C	4 month
Laboratory water	20° C	2.5 month
Soil	Dried in laboratory 18° C humid	< 4 days 69-72 days < 7 days
Urine	37° C 8° C	16 hours 6 days
Unprocessed milk	25-37° C 8° C	24 hours 48 hours
Whey	17-24° C 5° C	< 5 days >6 days
Wool	Warehouse	5 month
Manure	25° C	1 month
Straw	-	Days, months
Street dust	-	3-4 days
Pastures	Sunlight Shadow	< 5 days > 6 days
Wood walls and floors	-	3-4 days

## MATERIALS AND METHODS

**COLLECTION OF ANIMAL SAMPLES.** In each commune, the veterinary collects once a week all blood samples from animals and takes them to the Laboratory of the

Veterinary Station in the region of Korça. Usually 5-7 ml of blood is taken from the sick animal and is brought to the laboratory in sterile tine bottles.

*AGLUTINATION TEST WITH SPECIFIC SERUMS (ROSE BENGAL).* The serological identification of brucellas is only made as a genre. On one side of the glass a drop of diluted serum 1/5 or 1/10 is placed. Meanwhile, another kind of non-antibrucellar serum is added for use control, which does not contain antibrucellar aglutinine, so that the possibility of a false positive reaction may be avoided. A part of the culture to be dropped on the glass shall be mixed with the serum, taking care not to have a very dense mixture. Agglutination usually develops after one or two minutes. Analysis is performed at room temperature, 22-27°C (figure 3.a, b).



**Figure 3a: Sample is positive after agglutination with Rose Bengal.**



**Figure 3b: Sample is negative, not agglutination.**

*THE TEST OF AGLUTINATION IN TEST-TUBES (WRIGHT TEST).* The Wright Test is made to determine the caption of aglutinines in the blood serum. Original technique has been modified. *In the laboratory of Korça, it is performed as follows:*

We spin the blood brought for analysis and extrat its serum. We place six test-tubes on the support, plus one for the check, i.e. seven in all. In the first test-tube we pour 1.9 ml of physiological solution. In the first tube we add 0.1 ml serum. From the first tube to the sixth one, we take 1 ml in sterilized disposable pipettes for each dilution. In the last dilution, we spill 1 ml. We do not the control. From the sixth test-tube, we extract 0.75 ml up to the first tube and in all tubes there remain 0.25 ml. After dilution with 1/5 brucellar antigen with physiological solution, we mix it with the pipette and we pour in each test-tube with various dilutions from the first to the sixth 0.25 ml of antigen. We also add the same quantity to the control one. The reading of the result is made after 24 hours, when the test-tubes have been incubed in the thermostat in the temperature 37°C. The level of agglutination is determined by viewing the scale of clarity without shaking the test-tubes.

Full Agglutination is noted with four + (++++).

Clarity in the amount of 75% , with almost full agglutination is noted with three + (+++).

50% clarity with emphasized agglutination is noted with two + (++) .

25 % clarity of little agglutination is marked by one + (+).

Test-tubes without clarity and without agglutination are considered negative (Andoni, 1083; Andoni & Jocaj, 2000; Moreno et al., 2002; Şahin et al., 2004).

## RESULTS AND DISCUSSIONS

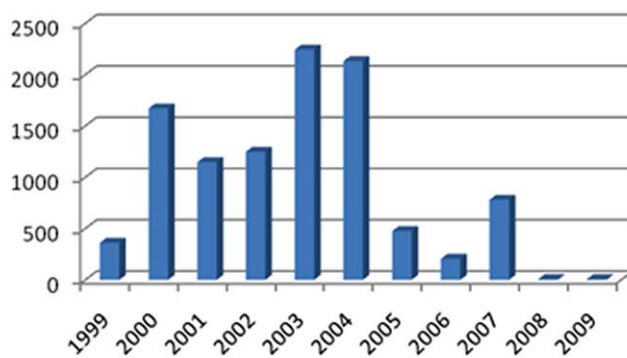
Table 2 gives a summary of the studied period (the years 1999 – 2009) for the livestock in the region of Korçë:

Infection by *Brucella melitensis*, the number of hotbeds for each year of study, positive animals, traced animals, eliminated and brucellinated ones. Depending on this situation, we are going to interpret step by step not only the situation created after each year, as we find various infections in different years, but also the necessity of the brucellination and disposal of infected animals, as well as the measures for the future.

**Table 2: The dynamics of the spread of brucellas in sheep and goats.**

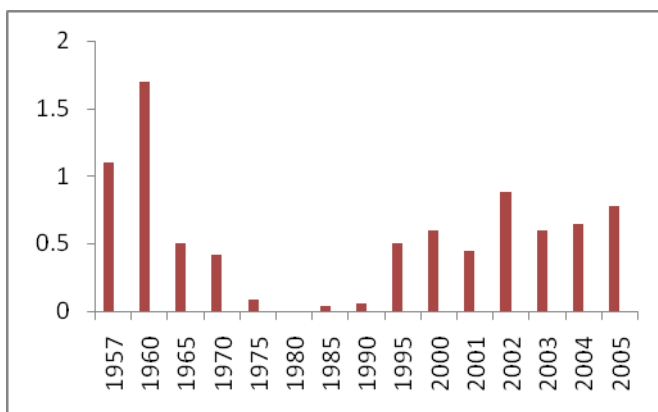
Year	Nr. of all livestock	Nr. of hotbed	Livestock of track	% of infection	Positive with brucellosis	%	Eliminate
1999	162 330	24	60862	37.3	361	0.59	24
2000	159 777	63	123984	76	1 671	1.34	63
2001	157 600	66	103186	5	1 147	1.1	66
2002	150 442	84	136688	94	1 249	0.9	84
2003	146 271	100	166683	114	2 244	1.31	100
2004	153 700	68	138405	90	2 132	1.28	2132
2005	167 740	55	18931	11.3	475	2.51	475
2006	186 786	52	34059	18.2	205	0.6	180
2007	159 659	16	65957	41.3	781	1.18	781
2008	163 060	16	1429	0.88	7	0.48	7
2009	167 650	17	247	0.14	8	0.54	8
Total		561	850 431		10 280		3 920

As we see from the data, table 2 and graphic 1, out of 10 280 animals resulted as positive with *B. melitensis*, in the years 2003 and 2004 this infection was at its peak, with 2244 animals and 2132 positive. This number has increased during the years. After the year 2005, there was a considerable decrease. This for the fact that in the year 2004 began the brucellization of animals in the region of Korça. The fact that in the recent years 2007, 2008 and 2009 we have a decrease in positive cases up to 7 and 8 animals. This shows that in the Korça region the situation is improved, but neither the risk can not be considered as passed, nor the zone as immuned. For this reason, attention and control should always be there.



**Graph 1: The dynamics of the spread of brucellas in brucella positive animals.**

This is not only due to present hotbeds in this region, 17 for the year 2009, but also for the fact that Korça has a cold climate. Migration and immigration of animals to warm zones and neighbour countries makes danger inevitable. In addition, the non circulation of contaminated pasture lands, which must not be utilized for grazing for at least four months, is not taken into consideration. This is one of the reasons of the spread of brucella infection to new hotbeds. This is also accompanied by places or habitats of animals, where the bacteria stay for months.

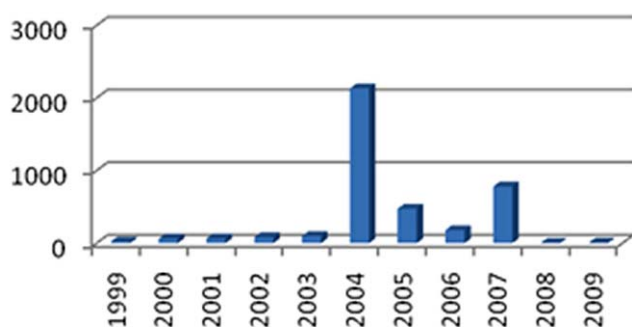


**Graph 2: Prevalence in animals through the years in our country.**

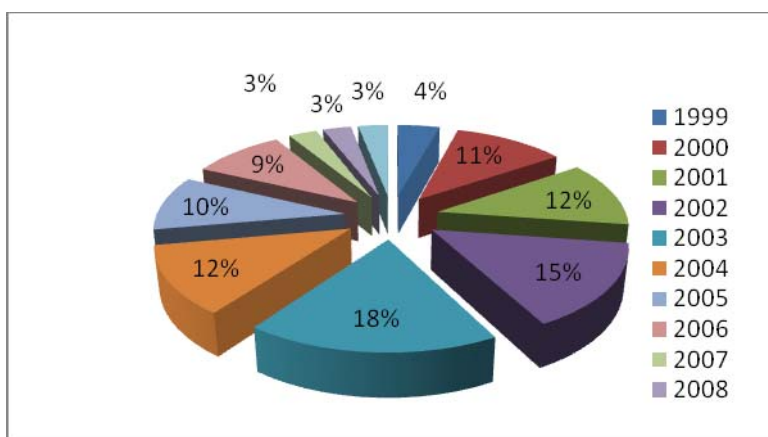
In order to make it more concrete, let us remember the fact that in the year 1988 Albania was pronounced as immuned from brucellosis, but as we have also

mentioned above, after the years 1990 infection reappeared, and such cases increased each year, extension being also geographic. This is reflected on graphic 2, which gives the prevalence of the cases of brucellosis in Albania from the year 1957 to the year 2005, including the years under study as well.

According to the data on table 2 and graphic 3, it results that the number of disposed of animals is higher in the year 2004, with 2132 cases. In this year began the tracing and brucellization of animals in the region of Korça. The number of eliminated animals was also high in the years 2005, 2006 and 2007. As a result of vaccination, during these years and on we see that the number of infected or positive animals decreases gradually. Eliminated animals are also less in number. In total, the number of eliminated animals is 3920 out of 10280 positive animals and 850 341 traced ones. Still unclear even to the veterinary specialists remains the fact that the number of positive animals does not coincide with the number of eliminated animals. We can well say that this is one of the weakest points in the care and work performed in the communes and municipalities for the decrease of the number of infected animals, which have been a potential risk and an infection source for the successive years, although the number of cases among animals and humans is decreasing.

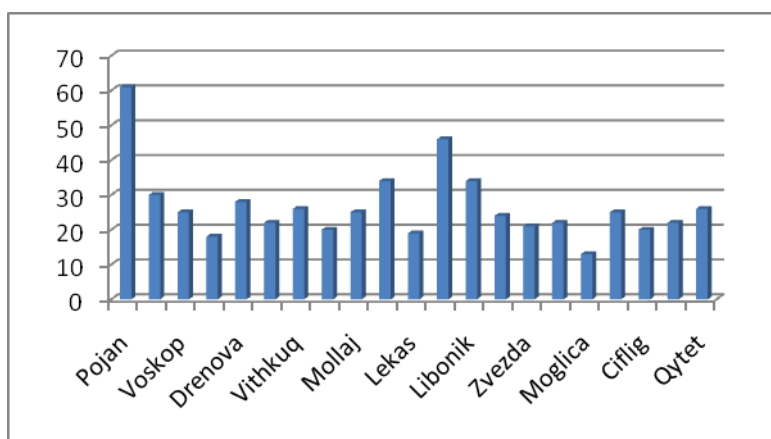


**Graph 3: The number of brucellosis infected animals eliminated.**



**Graph 4: The number of hotbeds with brucellosis.**

Table 2 and graphic 4 give the number of brucellosis hotbeds and their percentage. Their number until the year 2005 is stretched almost through the entire region of Korça, reaching its peak of 100 hotbeds in the year 2003. This has also influenced the huge number of cases among humans during these years.



**Graph 5: The dynamics of the spread of hotbeds with brucella.**

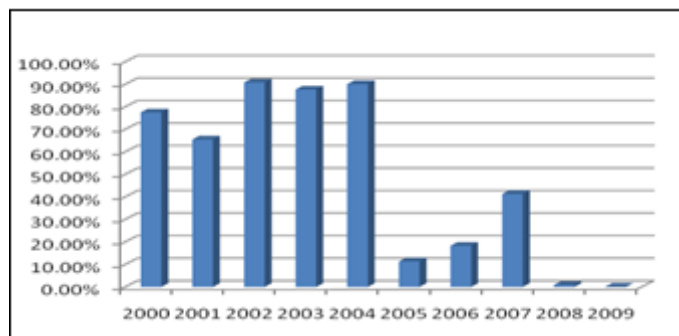
**Table 3: The dynamics of the spread of hotbeds with brucella, in the communes and in the city of Korça.**

Year	Nr.hotbeds	Pojan	Bulgarec	Voskopoj	Gore	Drenova	Pirg	Vithkuq	Liçenas	Mollaj	Vreshtas	Lekas	Mallq	Libonik	Voslopoja	Zvezda	Plasa	Moglica	Dishnic	Ciflig	Mborje	City
1999	24	2	2	3	0	0	2	3	0	3	1	2	2	2	2	0	0	0	0	0	0	0
2000	63	6	3	3	2	3	0	4	3	2	4	0	6	3	2	3	2	3	4	3	5	2
2001	66	7	4	2	1	5	1	2	3	2	5	1	8	5	4	2	4	0	2	2	2	4
2002	84	10	4	4	2	5	3	3	2	4	4	3	8	6	3	4	3	2	3	4	2	5
2003	100	14	5	5	4	4	4	5	3	5	5	5	7	5	4	5	4	3	3	2	3	5
2004	68	6	3	3	2	3	4	3	2	2	4	3	5	4	2	2	4	2	5	3	2	4
2005	55	5	4	2	3	2	3	4	4	3	3	2	3	2	3	2	2	1	2	1	2	2
2006	52	5	3	2	3	2	2	2	3	4	3	2	2	3	2	3	2	2	1	2	2	2
2007	16	2	1	1	0	1	0	0	0	0	2	1	2	2	1	0	0	0	1	1	0	1
2008	16	2	0	0	1	1	2	0	0	0	2	0	2	1	0	0	0	0	2	0	2	1
2009	17	2	1	0	0	2	1	0	0	0	1	0	1	1	1	0	1	0	2	2	2	0
<b>Total</b>	<b>561</b>	<b>61</b>	<b>30</b>	<b>25</b>	<b>18</b>	<b>28</b>	<b>22</b>	<b>26</b>	<b>20</b>	<b>25</b>	<b>34</b>	<b>19</b>	<b>46</b>	<b>34</b>	<b>24</b>	<b>21</b>	<b>22</b>	<b>13</b>	<b>25</b>	<b>20</b>	<b>22</b>	<b>26</b>

On the table 3 and on the graphic 5, we see that the most brucellosis infected communes are: Pojan with 61 hotbeds, Maliq with 46 hotbeds, Vreshtas with 34 hotbeds, Bulgarec with 30 hotbeds, Gore with 28, Vithkuq, Drenova and Qytet with 28 hotbeds, followed by Voskopoja, Mollaj and Dishnica with 25 hotbeds. Also, according to the table, we must stress that almost the entire region of Korça is infected by brucellosis, in every location of the livestock. In all cases, it has resulted that the traced sheep and goats have been infected by *Brucella melitensis*.

The big number of hotbeds is also related to tracing. Table 2 and graphic 6 reflect tracing in years, which has been intensifying, covering up to 90% of the animals of the region of Korça.

Tracing makes also the full recognition of the epidemiological situation in this region. The tracing data, positive cases both in livestock and in humans up to the year 2004 have also been the most numerous cases with brucellosis. We would like to stress that although the number of tracings after the year 2005 has decreased, the situation and the control must not be under estimated, since not only the situation is not fully healthy, but we must not also forget that the region of Korça is surrounded by regions of high infection from brucellosis, by neighbouring countries like Greece and macedonia, which are among the endemic zones of infection.



Graph 6: The percentage of animals traced.

## CONCLUSIONS

For the years 1999-2009, the number of traced animals has been in a total of 431 out of 850.

10 280 animals resulted to be Brucellosis positive.

For the years 1999-2009, 3920 animals were eliminated in the region of Korce.

The number of brucellosis hotbeds for the years under study in the region of Korce has varied from 16 to 100 hotbeds.

The communes with more hotbeds and biggest infection are: Pojan, Maliq, Vreshtas, Libonik, Drenova, Bulgarec etc.

In the year 2004 began the brucellination of animals in the Korça region.

These results show that brucellosis is not only a professional disease, but the malmanagement of products and byproducts of animals and their trading make this disease disperse also in the cities, among females and among the non-working age groups.

### RECOMMENDATIONS

The maintenance of occurrence and prevalence of brucellosis at low figures.

The continuation of the tracing of animals and their liquidation at the appropriate time.

The vaccination of animals as a necessity.

Keeping the animals away from contaminated pasture lands for at least 4 months.

The qualitative laboratory diagnostication and in other ways, unused until now.

The intersectoral cooperation for the prevention, control and uprooting of the brucellosis.

The better awareness of the community.

The preparation of policies, programs and clear effective technical-organization measures for the prevention of and fighting against brucellosis, as well as the termination of this epidemic process.

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