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The analysis of damping of the *Bovine Rhinotracheitis* National Recovery Program in the Czech Republic between 2006-2016

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Abstract

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Since the mid of 1970‘s Czech livestock production has been directly influenced by the occurrence of Infectious Bovine Rhinotracheitis (IBR) whose occurrence affects the economics of livestock agricultural production in the Czech Republic. IBR is a highly contagious, infectious respiratory disease that is caused by Bovine Herpesvirus-1. For this reason, in 2006 the National Recovery Program for IBR has been launched and in 11 years the number of farms with a declared IBR-free status has gradually increased from 19.02% to 99.21%. By the end of 2016 just 153 farms with 2552 bovine animals are still without IBR-free status. Within the program there was adopted the principle, that the removal of infected animals will take place mainly within the framework of the natural changes of herds. At the time of the start of the NRP there was a significant drop in number of cattle in the Czech Republic. Based on this assumption, the Czech Republic could in 2018 meet OIE‘s requirements on statut of IBR-free country, which consider at least 99.80% of the bovine herds free of IBR.

Keywords: infectious bovine rhinotracheitis; IBR; infectious disease; cattle; National Recovery Program; State Veterinary Administration; World Organization for Animal Health

Introduction

For more than four decades, Czech livestock production has been directly influenced by the occurrence of *Infectious Bovine Rhinotracheitis (IBR)* with an immediate impact on the economy of livestock breeding and demand for beef. IBR is a highly contagious, infectious respiratory disease that is caused by Bovine Herpesvirus-1 (BHV-1). It can affect young and older cattle (Nylin et al., 2000; Muylkens, 2007). In addition to causing respiratory disease, this virus can cause conjunctivitis, abortions, encephalitis, and generalised systemic infections (Lovato et al., 2003). IBR is characterised by acute inflammation of the upper respiratory tract (Kapil & Basaraba, 1997).

BHV-1 is introduced into the herd by the most frequently infected animals (Studdert & Arthey, 1989; Solis-Calderon et al., 2003). The virus then spreads through direct contact between animals, especially aerosols of respiratory, ocular and genital secretions (Grom et al., 2006). The incubation period after a natural infection is 4 to 6 days, where the infected animal becomes a life-sustaining virus and a potential source of infection for other animals (Kuijk, 2002; Trangadia et al., 2010). Once an animal has become infected, it remains infected for life, despite the development of a detectable immune response. The virus survives as a latent infection in nervous tissue and can be shed at any time when the animal is stressed. Purchase of infected animals is the main source of new infections (Beer et al., 2003; Abril et al., 2004).

Diseases caused by the virus can be serious; therefore it is a barrier to international trade. Cattle with BHV-1 antibody cannot be exported to BHV-1-free countries (Thiry et al., 2006). Neither can they be accepted into an artificial insemination center. There is no direct treatment for viral diseases (Nordegraafa, 1998; Nuotio et al., 2007). Infected animals should be isolated from the rest of the herd and treated with anti-inflammatory drugs and antibiotics for secondary infections if necessary (Mollema et al., 2005).

The course of infection may be acute, chronic or subclinical, with no apparent clinical signs, which is the most common course (Ros et al., 1999; De Oliveira et al., 2014). In clinical form, infection in the Czech Republic last occurred in 1995 after the import of cattle from Holstein breed from France. These were imports of heifers (Gu & Kirkland, 2007). Bacterial infection was associated with BHV-1 infection. The consequences were disastrous. Thirty heifers died as a result of this disease. The full development of the clinical picture has helped by transport stress, environmental change, nutrition etc.

In January 1, 2006, the National Recovery Program (NRP) for IBR was launched in the Czech Republic (NRP, 2016). After eleven years of recovery, this program was completed on December 31, 2016. At the beginning of the recovery in 2006, only 19% of the holdings of the total number of bovine holdings were recognized as IBR-free holdings. In the course of eleven years of recovery, the number of farms with a declared IBR-free status has gradually increased to 99.21%. Infected animals were at the end of 2016 on the last 27 farms. These farms are subject to emergency veterinary measures from January 1, 2017.

The aim of the paper is to provide a deep insight into the occurrence of IBR in the Czech Republic, to calculate the progress and the interim results of NRP as well as the current situation with impact on livestock production. The aim of the thesis is also to evaluate the fulfillment of the criteria given by the Article 11.11.4 of the World Organization for Animal Health (OIE) and the prospect of the Czech Republic being included in the list of groups of IBR-free countries (OIE, 2017) according to decision of EC No. 558/2004 of 15 July 2004 (EC, 2017).

Materials and Methods

The chief method used in this paper was the evaluation of legal rules, i.e. legal acts, regulations and implementing provisions, and their application to the IBR occurrence in Czech herds. In addition, the EU legislation concerning this issue was analysed and compared with the relevant legislation of the Czech Republic and in accordance with the Veterinary Act (VA, 2017).

At the same time, an analysis of the evaluation and assessment of the reduction of IBR incidence in the Czech Republic was carried out. This analysis was based on account of the National Recovery Program of the State Veterinary Administration of the Czech Republic (SVA, 2016) between 2006-2016 (NRP, 2016). Based on the long-term development of reduction of IBR, the obtained data were evaluated and was estimated the possible future development of Czech status of IBR-free country.

The effectiveness of the decrease in the incidence of IBR was measured by the percentage year-on-year decrease of the incidence of illness during the period 2006 – 2016 in the Czech Republic. The decrease was evaluated on yearly basis of the NRP and with annual year comparison.

Data and information from individual farms was obtained with the consent of individual farmers and protected against their loss and misuse.

Results and Discussion

According to the data in the Central Register of the State Veterinary Administration (SVA) of the Czech Republic by the end of 2016, there were 19 587 active cattle farms. However, from the findings of all 14 Regional Veterinary Administrations, no cattle are actually kept on 56 holdings of that number. This fact was taken into account when calculating the percentage of the freehold. Thus, the total number of active cattle farms is 19 531 by December 31, 2016. Compared to the December 31, 2015, it is year-on-year increase in the number of farms by 128. Table 1 shows the number of farms with bovine animals as well as the number of bovine animals and the number of bovine animals above 24 months between 2006-2016.

Table 1. Number of farms with bovine animals, number of bovine animals and number of bovine animals > 24 month in 2006-2016

Year	Bovine farms	Bovine animals	Bovine animals > 24 month
2006	24 087	1 354 753	688 721
2007	21 676	1 367 290	687 539
2008	19 558	1 351 316	685 423
2009	18 872	1 345 030	684 681
2010	18 394	1 333 264	662 447
2011	18 243	1 341 311	658 457
2012	18 472	1 350 661	657 753
2013	18 789	1 368 602	663 423
2014	19 383	1 407 555	679 650
2015	19 403	1 414 587	686 293
2016	19 531	1 413 570	687 514

Source: SVA

According to data of the SVA, a total of 1 413 570 bovine animals were recorded by the end of 2016. Adult cattle, i.e. over 24 months, were represented by 687 514. Year-on-year comparison is de facto the same population of cattle. The crisis in the purchase price of milk in the years 2010 to 2012 showed a decrease in the number of cattle, but since 2013 the cattle population has steadily grown and the last two to three years have stabilized on the number of cattle 685 thousand adult cattle. An objective parameter for assessing the actual size of the bovine population in the Czech Republic is the number of animals over 24 months of age. This eliminates young animals destined for export, which mostly come from other member states of the EU and are only housed in the Czech Republic for a short period of time (30 to 60 days) in insulation stables.

The IBR disease situation in the Czech Republic by the end of 2016

The systematic IBR eradication programme to be applied in a herd requires not only a well defined vaccination plan (that needs to be followed until necessary), but also appropriate biosecurity measures in place in order to reduce the risk of re-introduction of the virus in the herd through the purchase of latently infected carriers or new animals in the acute phase of the disease.

The recovery was initiated in 2006 by an initial serological examination of all animals from the age of 6 months in all farms that were not at that time IBR-free. The number of infected animals on the farms was high and amounted to 85-95%. In a number of herds, a reduced initial examination was carried out as a result of strong infestation and the herd was administratively classified as 100% infected. In most farms it means to change the whole herd.

The average annual replacement of herds was reported between 25-35%. In the case of some small farms and some of the special meat herds, the replacement may be less than 25%. The breeder, who recovered the herd responsibly, continuously eliminated the infected animals and immediately initiated the resolution of any problems, could heal his herd in 5-6 years.

At the beginning of 2006, when recovery from the IBR was initiated, the percentage of the officially free herds was 19.02%. For 11 years of recovery, this percentage has increased to 99.21%, which is an increase of 80%. The highest increase occurred between 2006 and 2008, then from 2013 to 2015. The initial significant increase in the number of rehabilitated farms was due to the investigation of the herds and the finding that some were already simple and needed to be confirmed. The process has also speeded up the fact that some herds in which a small number of infected animals was detected by an initial serological test were recovered by rapid elimination without vaccination. The intense increase in the years 2014 and 2015 was mainly due to the completion of rehabilitation for small breeders.

As of December 31, 2016, an officially IBR-free herd status was granted just in 2 regions of total 14 (Prague and Karlovy Vary). Table 2 shows an overview of the percentage of officially free herds during the NRP.

Table 2. Number of officially free herds between in 2006-2016

State to date	Officially free herds (%)	Increase (%)
31.12. 2005	19.02	–
31.12. 2006	29.82	10.80
31.12. 2007	47.99	18.17
31.12. 2008	57.32	9.33
31.12. 2009	59.90	2.58
31.12. 2010	62.71	2.81
31.12. 2011	64.98	2.27
31.12. 2012	69.75	4.77
31.12. 2013	71.74	1.99
31.12. 2014	82.81	11.07
31.12. 2015	95.60	12.80
31.12. 2016	99.21	3.61

Source: SVA

The number of farms on which IBR positive animals were present at December 31st, 2016, was reduced to 27. Due to the fact that the NRP was terminated by this date, there were introduced an extraordinary veterinary measures. In some cases these farms are operationally linked to other farms such as calves, young cattle or fattening, so the same NRP was applied to these holdings too. So in total, there are 16 another holdings with IBR positive animals. All farmers with a positive occurrence of the IBR are ordered to vaccinate their herds and adhere to the principles of biological safety in order to minimize the risk of spreading the disease to simple holdings.

The total number of infected (IBR positive) animals as of 31 December 2016 was 2552 (0.18%). Compared to the end of 2015, this is a year-on-year decline of 680 bovine animals. More than half (1314) of the number of positive animals are over 5 years of age.

By the end of 2016 there were 14 534 bovine animals (1%) in the mentioned infected holdings. This means that a total of 1 399 036 (99%) of animals were kept on holdings without confirmed positive animals as of 31 December 2016.

The list of infected farms also includes 4 holdings with only one positive animal. In some cases, they are animals to which the breeders have an emotional relationship and refuse

to exclude them from the herd, even if these animals are out of production due to their high age. In these cases, it is necessary to consider whether it is not a better way to restore the economy to order the animal disposal and to compensate the farmer for the loss than to cover the costs of vaccination within the mandated NRP. Table 3 shows Czech farms with IBR positive beef by region.

Table 3. Farms with IBR positive animals

Region, number of infected farms and farms	Animals total	IBR positive
Stredocesky region – 3 farms	*2 115*	*214*
Farm No. CZ 21001587	640	112
Farm No. CZ 21008416	557	85
Farm No. CZ 21070628	918	17
Jihocesky region – 5 farms	*972*	*222*
Farm No. CZ 31035327	2	1
Farm No. CZ 31131739	17	6
Farm No. CZ 31067344	162	4
Farm No. CZ 31000082	251	16
Farm No. CZ 31017664	541	196
Plzensky region – 2 farms	*1 491*	*363*
Farm No. CZ 32025316	655	227
Farm No. CZ 32025372	836	136
Ustecky region – 2 farms	*1 190*	*8*
Farm No. CZ 42046376	63	7
Farm No. CZ 42004684	1 127	1
Kralovehradecky region – 1 farm	*1 566*	*200*
Farm No. CZ 52036174	1 566	200
Pardubicky region – 2 farms	*1 150*	*379*
Farm No. CZ 53010717	604	195
Farm No. CZ 53020741	546	184
Vysocina region – 1 farm	*1 048*	*127*
Farm No. CZ 61033575	1 048	127
Jihomoravsky region – 1 farm	*710*	*15*
Farm No. CZ 62015846	710	15
Olomoucky region – 9 farms	*2 393*	*711*
Farm No. CZ 71038683	153	56
Farm No. CZ 71000389	770	202
Farm No. CZ 71083177	115	31
Farm No. CZ 71060464	9	1
Farm No. CZ 71023395	10	5
Farm No. CZ 71008354	1	1
Farm No. CZ 71000929	240	6
Farm No. CZ 71020550	832	349
Farm No. CZ 71020954	263	60
Zlinsky region – 1 farm	*1 898*	*313*
Farm No. CZ 72015195	1 898	313
Total in the Czech Republic	**14 534**	**2 552**

Source: SVA

Among the above-mentioned infected farms there are breeders who have recently refused to vaccinate animals under an approved health care program for which they have been fined in the past. As vaccination is now ordered under the NRP and is therefore reimbursed from the state budget, an improvement in the health status of these farms can be expected.

The lowest incidence of the disease was recorded in the age group under 30 months (4.31%). In the age group 30-73 months the IBR incidence was 69.39% and incidence above 73 months was 26.30%.

In the second half of 2016, one farm in the Olomouc region, which had until then been recognized as an IBR-free farm, was included among the infected farms. It was a small farm with 10 bovine animals with no detected shifts of bovine animals. Table 4 gives an overview of the farms where the status of an IBR-free farm was withdrawn due to reinfection.

In addition to the above 43 holdings under extraordinary veterinary measures (27+16), the SVA has ordered extraordinary veterinary measures on other holdings, although they are free of IBR positive animals. In particular, it is a farm that did not achieve the status of a simple farm by the end of 2016. It is about:

– 17 farms without registered positive animals and before the first final examination;

– 26 farms after the first negative final examination.

The group of farms that was not reported as an IBR-free farm, apart from the above, includes:

– 31 farms with fattening for export (export);

– 20 farms with fattening cattle coming from holdings with different IBR status;

– 6 farms with buffalo holdings;

– 14 small farms for which animal testing has to be carried out.

The number of holdings not recognized as officially free on 31 December 2016 is 153 (0.78%). Instead, 323 small farms of breeders were automatically granted the status of an IBR-free farm after January 1, 2017, as the animals were farmed on a farm.

Criteria for recognition of the Czech Republic as IBR-free country

In accordance with Article 11.11.1 of the World Organization for Animal Health (OIE), a state may be considered free of IBR if meets the following qualification requirements:

1. Qualification

To qualify as free from IBR, a country or zone should satisfy the following requirements:

a. the disease or suspicion of the disease is notifiable;

Table 4. Number of farms that have been withdrawn due to reinfection in 2010-2016

Region	Year						
	2010	2011	2012	2013	2014	2015	2016
Stredocesky	1	1	*2* + 1	1			
Jihocesky	2 + *1*	3		*1*			
Plzensky		1	1		*1*		
Karlovarsky	1						
Ustecky				*1*			
Liberecky	1						
Kralovehradecky	1						
Pardubicky	2	1			*1*	*1*	
Jihomoravsky	1						
Olomoucky			1	1	*2*		*1*
Moravskoslezsky		2					
Total	9 + *1*	8	3 + *2*	2 + *2*	2 + *2*	*1*	*1*
	24 + *9*						

Source: SVA
(*italic* – farm, which did not get IBR-free status by the end of 2016)

b. no animal has been vaccinated against IBR for at least 3 years;

c. at least 99.8% of the herds are qualified as free from IBR.

2. Maintenance of free status

For a country or zone to maintain its status free from IBR:

a. a serological survey should be carried out annually on a random sample of the cattle population of the country or zone sufficient to provide a 99% level of confidence of detecting IBR if it is present at a prevalence rate exceeding 0.2% of the herds;

b. all imported bovines comply with the provisions of Article 11.11.4., which deals with special recommendations for the importation of cattle destined for IBR-free herds.

Based on the above OIE requirements, the European Commission has issued a decision EC No. 558/2004 of 15 July 2004 listing the countries that have been granted the status of IBR-free country or region as of 31.12. 2016:

IBR-free country/region: Denmark – all regions, Germany – all regions, Italy – region Valle d´Aosta, Autonomous Province of Bolzano, Austria – all regions, Finland – all regions, Sweden – all regions, United Kingdom – region Jersey.

Country/region with an approved recovery program: Belgium – all regions, Czech Republic – all regions, Italy – region Friuli-Venezia Giulia, Autonomous Province of Trento, Luxembourg – all regions.

During the last decade major changes have taken place in Europe concerning IBR eradication through test and removal strategies. This scheme can only be adopted when the initial prevalence of the infection and the cattle density are low. It is clear that Europe heads towards eradicating IBR and each consecutive year we are one step closer to achieving it.

Conclusions

In accordance with Article 11.11.1 of the Terrestrial Code of OIE, a State may be considered free of IBR unless at least 99.8% of the bovine herd is recognized as free from IBR. This means that only 0.2% of the economy in the whole Czech Republic can be without a recognized IBR-free farm status, this represents a maximum of 39 farms.

As of December 31, 2016, a total of 0.78% of the farms were not officially recognized as IBR-free – it represents 153 farms.

The OIE requirement would appear to have failed when the criterion is strictly interpreted. However, several factors need to be taken into account:

– 39 holdings are in the final examination phase and will, in a few months, most likely be recognized as simple farms;

– 16 farms are operationally linked to holdings with positive animals. We consider the offshore holding together with the positive economy as one epidemiological unit, so we do not count the percentage of the farm economy;

– 20 farms with fattening can be automatically considered to be free in the near future because they will add animals only from IBR-free farm;

– 6 breeds can also be considered as free holdings as no antibodies to IBR have been confirmed in any slaughtered animal at the slaughterhouse. In these animals, due to the high risk of injury during handling, the sampling for examination is ensured finally in the slaughterhouse;

– 31 holdings with fattening for export. These are farms that can be called animal isolation, mostly from other Member States. Acceded animals from other EU member states have to fulfill the additional IBR Guarantee resulting from Commission Decision (EC) No. 558/2004, therefore these farms can be considered as free. Since these holdings do not carry out any transfer to other holdings within the Czech Republic and the animals are destined for export only, we do not allocate these farms to the calculation of the percent holding free;

– 14 small farms – these are farms that are unlikely to be IBR free, but until this status is confirmed by laboratory testing, they are under extraordinary veterinary measures where breeders are banned from moving animals. Unfortunately, breeders are also among those breeders who refuse to ensure sampling and examination of the animals even after several fines have been imposed.

On the basis of the above, it can be stated that 125 farms that do not currently have the officially recognized status of IBR-free farm, are not counted in the calculation of the percentage of IBR-free farms within the Czech Republic. In total, only 27 farms where infected cattle were found on December 31, 2016, are considered to be farms without a status of IBR-free farm.

This means that the percentage of IBR-free farms in the Czech Republic is 99.86%. The OIE can therefore be considered as fulfilled and the Czech Republic may send a request to the Commission for the status of an IBR-free country.

At the time of the start of the NRP there was a significant drop in number of cattle in the Czech Republic. Country has eradicated IBR in a practical and economically beneficial way, by introducing the NRP. The eradication of the virus was aided by the use of a live marker vaccine in all herds where sampling showed that the virus was evident. That is why the principle was adopted that the removal of infected animals will take place mainly within the framework of the natural changes of herds. For this reason, it was assumed that herds would be healed in the interval of 7-8 years. This assumption was based on the farm reported average annual herd turnover and also on the experience of the voluntary rehabilitation so far.

By the end of 2012 (within 7 years) 70% of farms had completely recovered their herds, and over 99% of all farms in the country managed to recover over the next four years.

That is why the NRP was terminated on 31 December 2016 and it was decided that the remaining infected holdings would be recovered within the framework of extraordinary veterinary measures. Although the cost of vaccination in infected farms is reimbursed by the state, on the other hand, it has the potential to interfere with the process of healing and the elimination of positive animals in the form of an age restriction for their harvesting. It is assumed that these restrictions for farmers can achieve a substantial reduction in the number of positive animals, and in the course of a few years, to heal the last infected farm.

Despite the effect this disease has on animal health and productivity, its main significance is as a barrier to the export of live cattle to other regions or countries within Europe, where the disease has already been eradicated. In future, in order to gain access to these markets, herds will have to be able to prove freedom from BHV-1 infection.

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