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EPIDEMIOLOGY OF BOVINE SPONGIFORM ENCEPHALOPATHY IN CATTLE IN POLAND

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Summary. The aim of the paper was to present the epidemiological situation regarding BSE epidemic in Poland with respect to cattle population, active surveillance and the control measures. Epidemiological data from the archives of the national reference laboratory for animal TSEs at the National Veterinary Research Institute and from the archives of the General Veterinary Inspectorate in Warsaw were used in the study. Between 2001 and the end of April 2015 BSE was diagnosed in 75 animals. Sixty one cases were classical BSE and 14 were atypical BSE (12 of L-type and 2 of H-type). Almost 6 million animals were tested using rapid tests. Dynamics of C-type BSE shows constant rise until 2005 when the highest number of cases (20) was recorded with sharp drop in the following years. Prevalence of atypical BSE shows stable trend with slight fluctuations. Traditional feeding was used in 65 and 90% of classical and atypical BSE cases, respectively. On the other hand, traditional feed was supplemented with MBM and milk replacers in 46 and 10% of classical and atypical BSE cases, respectively. Despite the high infectious load introduced into Poland especially with MBM, the number of cases was relatively low. In Poland, relatively high number of atypical BSE cases was recorded, comprising 19% of all BSE-positive animals. Mean age of classical BSE cases diagnosed annually does not show a decreasing trend which may reflect the late introduction of feed ban in Poland.

Keywords: bovine spongiform encephalopathy, Poland, prevalence, prion protein, control measures

Introduction. The outbreak of bovine spongiform encephalopathy (BSE) in cattle followed by the discovery of variant Creutzfeldt-Jakob disease (vCJD) linked with the consumption of BSE-contaminated food raised major concerns about human health.

Experience from UK and other European countries indicated that the use of contaminated meat-and-bone meal (MBM) in animal rations was the main route of BSE spread in cattle. However, the origin of BSE is still elusive and under discussion. Many countries denied any BSE risk in their native born cattle until they found first cases. Active surveillance with rapid tests carried out at the abattoir and in the fallen stock improved strongly the detection of BSE, and the first case was diagnosed in Poland in May 2002. From 2002 through 2015 (end of April), 75 cases were diagnosed including classical cases and atypical cases. Main control measures adopted in Poland to monitor the disease and minimize the risk of spreading of the agent included: passive surveillance of clinical suspects (introduced in 1996), MBM feed ban for ruminants (1999), active surveillance using rapid tests in healthy slaughtered and risk group cattle (January 2001), mandatory removal of specified risk material (SRM) from animals intended for human consumption (April 2001), proper treatment of animal waste (introduced in 2002) and feed ban of processed animal protein for all farmed animals (2003).

The aim of the paper is to present the epidemiological situation regarding BSE epidemic in Poland with respect to cattle population, active surveillance and the control measures.

Material and methods. Epidemiological data from the archives of the National Reference Laboratory for Animal Transmissible Spongiform Encephalopathies (TSEs) at the National Veterinary Research Institute in Pulawy and from the archives of the General Veterinary Inspectorate in Warsaw were used in the study. Additionally, information provided in annual reports from Member States on BSE and scrapie published by the Directorate-General for Health and Consumer Protection of the European Commission were utilized.

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Results. ***Implementation schedule of active surveillance and mass testing to detect BSE***. Poland started testing for BSE in 1996 when clinical suspects were subjected to histopathological examination. While this target group proved to have the highest prevalence rate of BSE (positive cases per 10 000 animals tested), the number of samples submitted annually for testing was very low (up to 844 samples per year). Active surveillance using rapid tests was initiated in January 2001 and became fully operational in November 2001, when 4 regional labs started routine testing. Over 110 000 samples were tested before the first case was diagnosed and confirmed in May 2002. Since then the number of samples tested per year has been growing from 286 592 in 2002 to 637 130 samples in 2010 (Tab. 1). A high percentage of samples tested came from healthy slaughtered animals; it varied between 97% of all samples tested in 2002 and 90.5% in 2007, along with the constant increase of the number of samples from fallen stock submitted to BSE testing (from 0.7% in 2002 to 7.9% in 2007). The full implementation of testing regime in terms of the number of samples required to be tested began in mid 2002.

Epidemiological situation regarding BSE. Between 2001 and the end of April 2015 BSE was diagnosed in 75 animals of which 57 were healthy slaughtered (76% of all cases), 5 were emergency slaughtered, 9 were fallen stock, 3 cases were found as clinical suspects and 1 case was a cohort animal. All BSE cases were diagnosed in native born cattle. Sixty one cases were identified as classical BSE and 14 – atypical BSE (12 of L-type and 2 of H-type). Almost 6 million animals were tested using rapid tests, which means that the detection of one case, on average, required the testing of 79 670 animals. The distribution of cases and animals tested per year is presented in Table 1.

Dynamics of C-type BSE shows constant rise until 2005 when the highest number of cases (20) was recorded with sharp drop in the following years. Prevalence of atypical BSE shows stable trend with slight fluctuations (Fig. 1). Except for 2006 and 2008 when single H-type cases were found all other atypical cases were of L-type.

Table – 1 Healthy slaughtered and risk group animals (fallen stock, emergency slaughter, clinical suspect, sanitary slaughter) tested with rapid tests for BSE in years 2001–2013 and the number of confirmed cases of classical and atypical BSE (until the end of April 2015)

Testing period	Healthy slaughter	Risk group	Total tested	Classical BSE	Atypical BSE
2001.11–12	29 882	427	30 309	0	0
2002	278 709	7 883	286 592	3	1
2003	428 452	26 961	455 413	5	0
2004	445 198	35 918	481 116	9	2
2005	472 028	43 948	515 976	18	2
2006	540 148	53 973	594 121	8	2
2007	546 243	57 567	603 810	7	2
2008	556 583	54 983	611 566	5	0
2009	587 339	50 733	638 072	3	1
2010	590 171	47 069	637 240	2	0
2011	440 856	35 050	475 906	0	1
2012	299 682	26 598	326 280	1	2
2013	280 145	38 704	318 849	0	1
Total	**5 495 436**	**479 814**	**5 975 250**	**61**	**14**

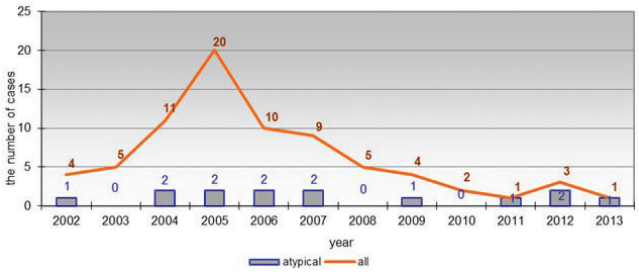

Figure 1. The number of all BSE cases and atypical BSE cases diagnosed in Poland in years 2002–2013

The annual incidence rate of BSE (defined as a number of cases per 1 million of animals tested annually) is shown in Figure 2.

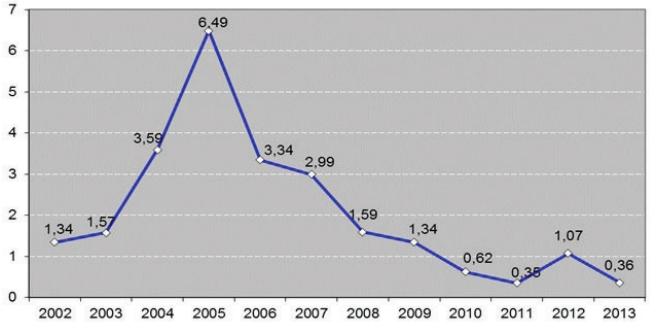

Figure 2. Annual incidence rate of BSE cases in Poland in years 2002–2013

Since atypical BSE is found only in older animals (8 years and above), age structure of cattle population could be a possible explanation for the relatively high frequency of the appearance of this form of BSE in Poland. On average animals of 7 years and above comprised 41% of all cattle tested in years 2002–2010. Mean age of classical and atypical BSE cases was 8 and 12 years, respectively.

Mean age of classical BSE cases can be an indicator that the disease is fading away when the average age of BSE cases identified in consecutive years is constantly growing. Such a trend is directly related to the successful implementation and the enforcement of control measures like feed ban or SRM removal. Growing age of positive cases was observed from 2009 until 2011 (Fig. 3). Then in 2012 a classical BSE case was diagnosed in 6 years old cow and since then no classical BSE cases were identified in Poland. Such an unstable trend indicates that the time span from the introduction of control measures (total feed ban was introduced in November 2003) to the time when their effect is observed is too short and it requires further surveillance.

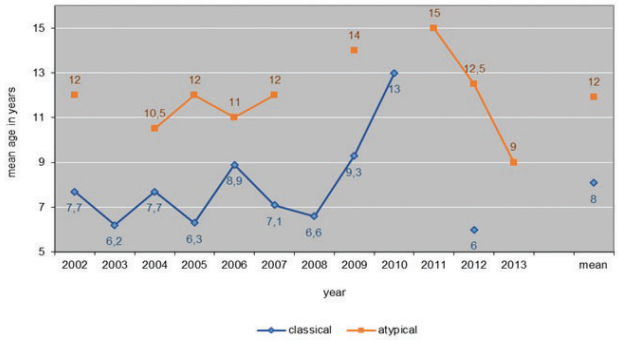

Figure 3. Mean age of positive cases with respect to classical and atypical BSE in years 2002–2013

Feeding data is available for 62 cases (52 classical BSE and 10 atypicals). Traditional feeding was used in 65 and 90% of classical and atypical BSE cases, respectively. On the other hand, traditional feed was supplemented with MBM and milk replacers in 46 and 10% of classical and atypical BSE cases, respectively.

Discussion. BSE epidemic in Poland can be analyzed from various perspectives. One of the parameters can be the size of the epidemic with respect to the infectious load introduced to Poland with live animals and meat-and-bone meal imported from BSE affected countries. Despite the high infectious load introduced into Poland especially with MBM, the number of cases was relatively low reaching 75 cases by the end of April 2015.

The number of samples tested for BSE reached almost 6 million samples meaning that the detection of a single case required the testing of almost 80 000 animals.

Another important aspect is the internal stability meaning the power to control the disease and stopping its spread by implementing various protective measures. If we consider a constant age distribution of the population over time during the period of interest, the main simple indicator of a decreasing trend of the BSE epidemic in a given country is an increasing of the mean age of the cases found in the years following the introduction of control measures. However, since the incubation time of BSE is 4–6 years on average, it takes several years before any conclusion can be drawn. Poland introduced the ruminant feed ban in 1999 and the total feed ban in 2003 meaning that between 2003–2005 and 2008–2010 the decline in the number of positive cases and increasing mean age

should be observed. For Poland, this holds true only for the annual incidence rate, reaching its peak with 20 cases in 2005, followed by sharp drop in the following years. Opposite to this observation, the mean age of positive cases fluctuated from year to year from 2002 to 2008; however, the increase of the mean age of classical BSE cases in 2009 and 2011, though based on a very few cases, is encouraging but needs confirmation in the following years. In addition to the drop in the number of cases detected in the past years, it might be the sign of the declining of the epidemic, and could be linked to the implementation of the total feed ban in 2003. However, the very recent classical BSE case was diagnosed in a 6 years old cow born in 2006.

Another interesting observation is the relatively high number of atypical BSE cases recorded among positive cases comprising 18.6% of all BSE-positive animals. The prevalence rate of atypical BSE, which was 2.1 cases per million tested animals, whatever their age, was more than twice to the value observed in France (0.76 as the sum of 0.41 for H-type and 0.35 for L-type). Of all atypical cases, 64% was found in healthy slaughtered animals, while for classical BSE this value was 80%. Feeding data gives additional proof that atypical BSE could be a spontaneous form of this disease not related to MBM feeding.

Conclusions. Despite significant amount of MBM imported to Poland, the number of BSE cases diagnosed is rather low, at 75 cases. More than 18% of all BSE cases were classified as atypical BSE, regarded as the spontaneous form of BSE not related to feeding habits. Last case was diagnosed in Poland in February 2013, and it was atypical BSE. Mean age of classical BSE cases diagnosed annually does not show a decreasing trend which may reflect the late introduction of feed ban in Poland.

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