

Serosurvey of sheep and goats to *Chlamydia psittaci* in Slovakia during the years 1996–2000

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ABSTRACT: In the Slovak Republic during the years 1996–2000, total 30 278 blood samples from sheep and 4 756 from goats were examined serologically by the method of a complement fixation. The IgG antibodies against *Chlamydia psittaci* in sheep and goats according to individual years were as follows: 1996 – 6.37% sheep/3.94% goats, 1997 – 9.25%/10.02%, 1998 – 9.57%/2.96%, 1999 – 7.91%/3.69%, 2000 – 10.99%/6.08%, respectively. In most clinically healthy animals, the low levels of IgG antibodies in dilution of 1 : 16 to 1 : 32 were detected. In sheep during the years of 1996, 1998, 1999 and 2000 the high levels of IgG antibodies 1 : 256 to 1 : 1 024 were caught unambiguously testify to the chlamydial abortion in sheep. In goats, the high titres were caught in 1997 and 2000 – 1 : 256 to 1 : 512, also confirm the chlamydial aetiology of the infectious process.

Keywords: sheep; goats; *Chlamydia psittaci*; complement fixation; IgG antibodies

INTRODUCTION

Infections of genital system of sheep and goats caused by chlamydiae are monitored from 1950, when Stamp *et al.* (1950) described enzootic abortion of sheep and isolated the causative agent *Chlamydia psittaci*. Trávníček *et al.* (1978) and Sádecký *et al.* (1978) confirmed repeatedly the chlamydial abortion in sheep in Slovakia.

After the revision of the family Chlamydiaceae, Everett *et al.* (1999a) proposed this family in to two genus namely *Chlamydia* (*Ch.*) and the *Chlamydophila* (*Chl.*). Genus nov. *Chlamydophila abortus* (previously *Chlamydia psittaci*, biotype 1) will substitute *Ch. psittaci* the etiologic agent for abortion of sheep, goats and cattle.

Storz (1971) described, infections in a tender of sheep, in which a chlamydial abortion was caused experimentally. Giroud *et al.* (1956) isolated strains of *Chlamydia psittaci* from the lungs of aborted human embryo as well as from placenta of aborted woman, who was in contact with sheep and goats affected by pneumonia and had abortions. Roberts *et al.* (1967) also described a case of chlamydial infection in pregnant woman followed by abortion with the history of contact with aborted sheep. Hyde and Benirschke (1997) informed about first case of human abortion in USA related with sheep infected by *Ch. psittaci*. Pregnant women should be warned to avoid contact with sheep and their products, particularly during the lambing period.

The study aimed at monitoring of IgG antibodies in sheep and goats to *Ch. psittaci* in Slovakia during the years 1996–2000.

MATERIAL AND METHOD

Material is represented by blood samples from sheep and goats examined at State Veterinary Institutes of the Slovak Republic in the following years and numbers:

Sheep: 1996 – 4 268 samples; 1997 – 11 285 samples; 1998 – 7 072 samples; 1999 – 3 488 samples and 2000 – 4 165 samples.

Goats: 1996 – 837 samples; 1997 – 1 038 samples; 1998 – 946 samples; 1999 – 1 491 samples and 2000 – 444 samples.

Blood sera were examined by micro and macro complement fixation (CF). Sera with titre of IgG antibodies 1 : 32 and higher were considered positive (Manual of Standards, 1996). In CF we used species specific antigen of *Chlamydia psittaci* (Biovet Ivanovice na Hané, Czech Republic.)

RESULTS

Year 1996. The significant portion of examined blood samples formed by 4 268 sera of sheep. Antibodies to

Chlamydia psittaci were detected in 272 animals, i.e. 6.37% (Figure 1). Sheep was an interesting group in the view of level of titre occur. The numbers of positive animals in titres 1 : 32, 1 : 64 and 1 : 128 were 100, 92 and 49, respectively. Positive reactions in higher dilution of sera was recorded in 22 cases (1 : 256) and in 9 cases (1 : 512). Such a levels of antibodies indicates chlamydial abortion (Figure 2).

From the total number of 837 examined sera from goats (Figure 1) 33 samples (3.94%) were positive. The detected titres were 1 : 32 (21) and 1 : 64 (12) (Figure 2).

Year 1997. From the 11 285 of sheep blood sera, 1 044 (9.25%) were seropositive (Figure 1). In CF titres for chlamydial antibodies were found in quite narrow range from 1 : 32 (564) to 1 : 64 (480) (Figure 2). In 1997 according to reports, there was no chlamydial abortion in our raisings.

In 1997 total 1 038 goats were examined with seropositivity in 104 animals i.e. 10.02% (Figure 1). In CF titres of chlamydial antibodies were found from 1 : 32 (23), 1 : 64 (39), 1 : 128 (17), 1 : 256 (11) and 1 : 512 (14) (Figure 2). Higher titres were diagnosed in private small raisings where young goats were delivered.

Year 1998. In the year 1998 total 7 072 sheep were examined, from which 677 were seropositive – 9.57% (Figure 1) mostly in the range of titres from 1 : 32 (201), 1 : 64 (377), 1 : 128 (61), while high titres of chlamydial antibodies 1 : 256 (32 animals), 1 : 512 (4) and 1 : 1 024 (2) were seldom (Figure 2). In State Veterinary Administration of Slovak Republic in the year 1998 enzootic chlamydial abortion of sheep (OIE B 156) has not been reported.

In the year 1988 total 946 goats were examined (Figure 1). Only 28 of them (2.96%) were detected positive for chlamydial antibodies with the titres from 1 : 32 (17) to 1 : 64 (11) (Figure 2).

Year 1999. In the year 1999 total 3 488 sheep blood sera were examined, from them 276 samples, i.e. 7.91% were confirmed for chlamydial antibodies (Figure 1). In CF we found the most often titres of antibodies in 1 : 32 (179), 1 : 64 (55) and 1 : 128 (24) dilutions, while high titres 1 : 256 (14 cases), 1 : 512 (1) and 1 : 1 024 (3) were observed (Figure 2). Although in previous years, State Veterinary Administration of SR officially did not recorded enzootic chlamydial abortion in sheep.

1 491 goats were examined for chlamydiosis in 1999. Chlamydial antibodies were diagnosed only in 55 of them (3.69%), (Figure 1). In CF the most frequent titres of antibodies were found from 1 : 32 (32) to 1 : 64 (23) (Figure 2).

Year 2000. In this year 4 165 sheep were examined and from that 458 (10.99%) were found to be seropositive (Figure 1). In CF we found the most often titres 1 : 32 (214), 1 : 64 (175), 1 : 128 (29), while higher levels of antibodies 1 : 256 (36 animals) and 1 : 512 (4) were also confirmed (Figure 2). Enzootic chlamydial abortion of sheep was not officially confirmed.

From total of 444 examined sera from goats 27 samples were positive forming 6.08% (Figure 1). The levels of antibodies detected in the range 1 : 32 (7) till to 1 : 64 (4) oscillated, with the exception of one private farm with the levels of antibodies 1 : 256 – 9 and 1 : 512 – 7 animals (Figure 2).

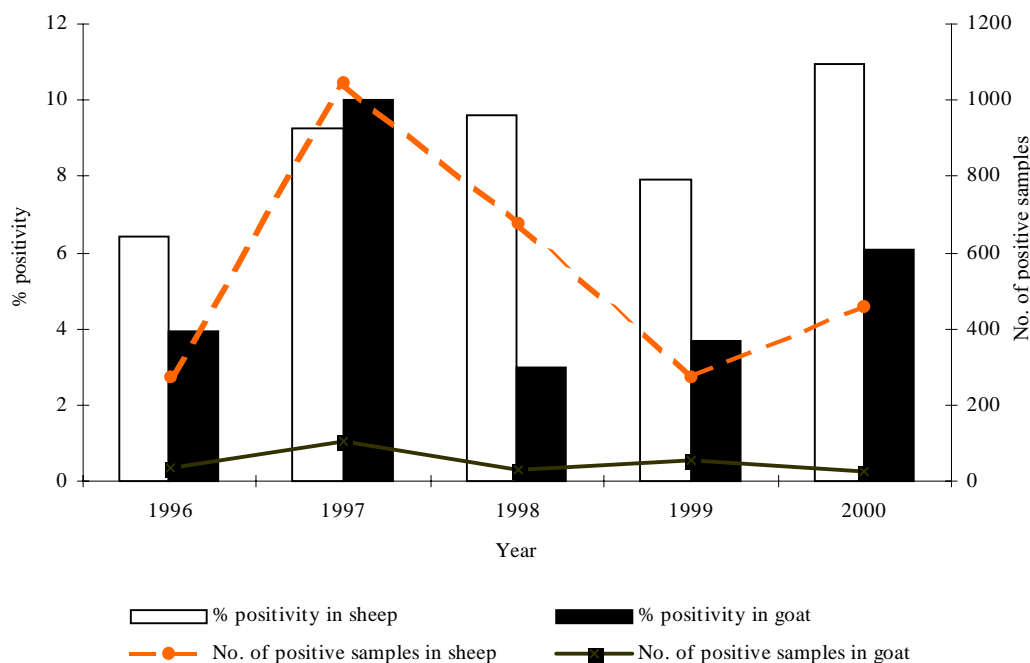


Figure 1. Numbers of positive samples and % of positivity in sheep and goats in Slovakia during the years 1996–2000 against *Chlamydia psittaci*

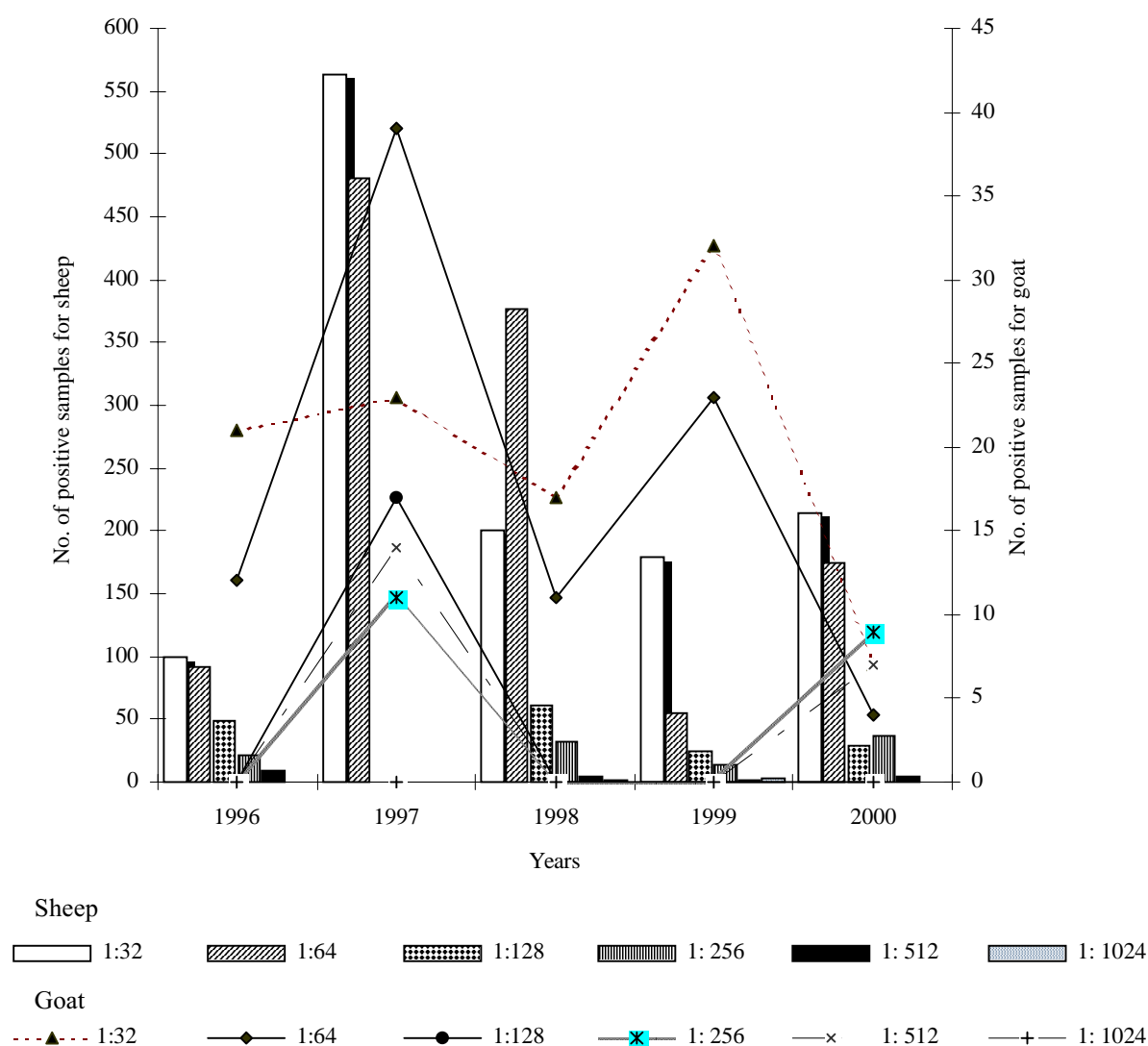


Figure 2. Numbers of positive samples in sheep and goats in Slovakia during the years 1996–2000 and the levels of IgG antibodies against *Chlamydia psittaci*

DISCUSSION

30 278 sera from sheep and 4 756 blood sera from goats were serologically (CF) examined in Slovakia (Figure 1) in the evaluated period 1996–2000. IgG antibodies most often confirmed in serum dilutions from 1 : 32 (1 258 cases) to 1 : 64 (1 179). Titres lower than 1 : 32 in individual samples are considered as non-specific (Manual of Standards, 1996), because *Chlamydia psittaci* contains common antigens with *Chlamydia pecorum* and with some Gram-negative bacteria (e.g. *Acinetobacter*).

Low levels of antibodies can be detected in absolute majority of clinically healthy sheep, because of faeco-oral cycle (Storz, 1971), the intestinal tract get colonised by chlamydiae shortly after weaning. These chlamydiae consequently stimulate the production of antibodies in low levels 1 : 32 to 1 : 64. These low levels of antibodies

do not signal clinical illness in animal and do not have high diagnostic value from the viewpoint of prognosis. Only working out and introducing into practice a method of polymerase chain reaction (PCR) (Everett *et al.*, 1999b; Everett and Andersen, 1999) can make possible an exact distinction of invasive and pathogenic species of chlamydiae.

To confirm enzootic chlamydial abortion of sheep, if other aetiology is excluded, detection of IgG antibodies in dilutions 1 : 256 and higher is significant from the viewpoint of diagnostics. Kennedy *et al.* (2001) developed two serological tests – indirect immunofluorescence and ELISA for the detection of fetal antibody to *Ch. psittaci*. Immunocytologic detection of *Ch. psittaci* from cervical and vaginal samples of chronologically infected ewes was developed and described (Papp *et al.*, 1998).

In the observed period, such high titres of IgG antibodies in sheep were recorded as follows: in 1996 – 1 : 256 (22) and 1 : 512 (9); in 1998 – 1 : 256 (32), 1 : 512 (4) and 1 : 1 024 (2); in 1999 – 1 : 256 (14), 1 : 512 (1) and 1 : 1 024 (3); and in 2000 – 1 : 256 (36) and 1 : 512 (4) (Figure 2). These high levels clearly testify the chlamydial abortion in sheep, which probably was not noticed by the breeders, because it was not recorded in the statistics of State Veterinary Administration of the Slovak Republic.

To increase of chlamydia antibody response in sheep vaccinated against enzootic abortion caused by *Ch. psittaci* (ovis) is recommended to inject to the animals sodium selenite (0.1mg/kg b.w.) twice with a three week interval (Gianidis *et al.*, 2000). Vaccination is an important and recommended tool for a control of enzootic chlamydial abortion of sheep (Gajdošová *et al.*, 1994). Susceptibility of the vaginal mucosa of sheep to infection with *Ch. psittaci* prior to breeding was demonstrated and excretion of chlamydiae after abortion was confirmed (Papp *et al.*, 1994; Papp and Shewen, 1996).

High titres in goats were recorded in 1997 as 1 : 256 (11) and 1 : 512 (14) as well as in 2000 as 1 : 256 (9) and 1 : 512 (7). Which confirmed chlamydial abortion similarly as in sheep. High levels of antibodies are present only during the process of abortion or after it, so chlamydial abortion can be confirmed only after abortion. Thus the results of serological examinations can indicate the need of vaccination of the rest of pregnant animals or the need to carry out preventive vaccination in the next period of mating. For difference between immunologically unprotected and protected sheep against chlamydial abortion it is possible to use skin allergic test (Trávníček *et al.*, 1991).

In connection with different diagnostic value and significance of different levels of antibodies to *Chlamydia psittaci*, it is necessary to evaluate separately preventive examinations of sheep and goats though they are clinically healthy mostly during transportation, exposition, marketing etc.) and separately the examinations for animals with clinical signs, especially abortions. Higher levels of IgG antibodies in male animals (> 1 : 64) together with clinical signs on testis and epididimides always indicate possible chlamydial aetiology.

CONCLUSION

We recommend serological monitoring of ewes after parturition or abortion in intervals of 0, 14 and 28 days. This way of examination we recommend to keep in breeding raisings producing breeding stock and also in farms for mutton purpose to avoid economic losses. The titre 1 : 128 we consider like doubtful and the titres 1 : 256 and higher as a significant for confirmation of chlamydial aetiology of abortion.

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