Survey on circulation of infectious bronchitis virus strains in Northern Italy

Calogero Terregino¹, Maria Serena Beato¹, Giovanni Ortali², Cristian De Battisti¹, Alessandra Drago¹

¹Istituto Zooprofilattico Sperimentale delle Venezie. Legnaro (PD), Italy
²Associazione Italiana Allevatori. Verona, Italy

Corresponding author: Dr. Calogero Terregino. Istituto Zooprofilattico delle Venezie. Virology Department. Viale dell’Università 10, 35020 Legnaro (PD), Italy - Tel. +39 049 8084377 - Fax: +39 049 8084360 - Email: cterregino@izsvenezie.it

ABSTRACT

Infectious Bronchitis (IB) still causes significant health problems in the poultry industry with high economic impact due to the virulence of some strains and the costs of vaccinations as a control measure for this disease. The presence of several serotypes of IB and the emergence of novel ones must be monitored in order to take appropriate action and to adapt the vaccination programmes to the prevalent serotypes. In order to establish which serotypes are circulating in densely populated poultry area (DPPA) of Northern Italy, a surveillance programme has been undertaken during 2004 and 2005. The results of this surveillance programme show the active circulation of 793-B, IT-02, the introduction of a novel strain, known as QXIBV, originally identified in China and the re-emergence of previously circulating serotype as B1648.

Key Words: Infectious Bronchitis, Broiler, QXIBV.

RIASSUNTO

INDAGINE SULLA CIRCOLAZIONE DEI VIRUS DELLA BRONCHITE INFETTIVA AVIARIA IN NORD ITALIA

La Bronchite Infettiva (IB) rappresenta ancora oggi uno dei principali problemi sanitari per l’allevamento avicolo intensivo. Allo scopo di approfondire le conoscenze sulla sua diffusione e sui sierotipi circolanti nelle aree densamente popolate (DPPA) del Veneto e Lombardia, dal 2004 è stato eseguito un piano di sorveglianza basato sull’introduzione di animali sentinel la allevamenti con sospetto di malattia e il monitoraggio degli allevamenti colpiti in precedenza. Il piano di monitoraggio ha confermato la significativa circolazione di sierotipi quali il 793-B e l’IT-02 ed ha evidenziato l’introduzione di un nuovo sierotipo precedentemente isolato in Cina e noto come QXIBV e il riemergere della variante nefropatogena belga B1648, la cui presenza in questa area non veniva segnalata da alcuni anni.

Parole chiave: Bronchite Infettiva, Broiler, QXIBV.

Introduction

Infectious Bronchitis (IB) still causes significant health problems in the poultry industry with a high economic impact due to the virulence of some strains and the costs of vaccinations as a control measure for this disease. The presence of several serotypes of IB and the emergence of novel ones must be monitored in order to take appropriate action and to adapt the vaccination programmes to the prevalent serotypes. In order to establish which serotypes are circulating in Northern Italy a surveillance programme has been undertaken during 2004 and 2005. The area involved in the monitoring programme was a densely populated poultry area.
(DPPA) which rears 30% of the Italian poultry production.

Material and methods

The surveillance programme was carried out monitoring flocks through the introduction of sentinel birds. SPF (Specific Pathogen Free) chickens were introduced into farms for a period of 7-10 days as sentinels. Tissue samples, collected from sentinels or sick birds (trachea, lung, kidney and cecal tonsils) were directly analysed in RT-PCR and submitted for virological investigations. The tissue homogenates were inoculated into the allantoic cavity of 9-to-11-day-old embryonated SPF eggs (Geb et al., 1998). Following a maximum of four blind passages, the allantoic fluid was harvested and examined by negative contrast electron microscopy for the presence of coronavirus particles (Hayat, 1985). In order to characterise the strains, viral RNA was extracted from the organs and from positive allantoic fluid. The strains were analysed in RT-PCR, with specific primers for the S1-gene (Adzhar et al., 1996), in order to generate a complementary DNA (cDNA). This cDNA, was sequenced (Keeler et al., 1998), and isolates were typed on the basis of the sequence. A total of 187 samples were collected from 60 farms.

Results and discussion

43/60 broiler and chicken backyard farms monitored were positive for IBV (Table 1). Of these, 20 were positive for IT-02, 13 for 793-B, 1 for B1648 and 8 for QXIBV. The presence of IT-02 was often associated with urolithiasis and enteric form, while 793-B was associated with mild respiratory form. QXIBV has been isolated only in the Veneto from 3 backyard flocks and from 5 broiler flocks. In these flocks the presence of this strain was associated with urolithiasis and mild increased mortality. The signs were observed in young birds of 3-5 weeks of age. The chickens showed depression, ruffled feathers, wet droppings and decreased growth. The mortality rates were often only 1-2 % more than the standard conditions and the recovery occurred in 2-3 weeks, in some case the severity of the disease was higher and the performance of birds was significantly affected. In the outbreak of B1648 a nephritic syndrome was observed. Furthermore another B1648 strain was isolated in young birds of a pheasant flock with high mortality rates and severe kidney lesions.

These results show an active circulation of at least 4 different serotypes of IBV in Northern Italy. IT-02 appears to be the most prevalent strain and is also widespread in other European countries such as The Netherlands and England. Serotype 793-B is still present, although it is unclear whether the isolates are field or vaccine strains. B1648 (Belgium nephropatogenic strain) seems to have re-emerged after some year of non appearance. QXIBV is a strain of novel introduction and it has never been described before in Italy.

Infectious Bronchitis appears to be an evolving disease which still causes important economic losses. The most important epidemiological aspects of IB that must be focused are the emergence of novel serotypes and the re-emerging of old ones. This provides evidence of the importance of monitoring programmes as an effective tool in following the evolution of the disease in selected areas.

Conclusions

In reference to the circulation of QXIBV in Northern Italy, there are some questions to be

Table 1. IBV serotypes and related symptomatology.

| IBV serotype | N. of positive/total of positive | Symptomatology        |
|--------------|---------------------------------|-----------------------|
| 793/B        | 13/43                           | Respiratory form      |
| IT-02        | 20/43                           | Urolithiasis and enteric form |
| QXIBV        | 8/43                            | Urolithiasis          |
| B1648        | 2/43                            | Nephritic form        |
answered. Little is known about the pathogenic characteristics and antigenic properties of this isolate, originally obtained in China and described also in Germany, Holland, Belgium and France (Worthing et al., 2005). In Italy the presence of this serotype was associated with nephritis and increased mortality in broiler flocks while the Netherlands isolate was associated with “silent” hens in layer flocks. How this strain has reached Europe and whether it has been due to one or multiple introduction from Asia is unclear. The introduction of this Chinese strain indicates that avian viruses present in the Far East may reach backyard and industrial poultry population of European countries with important health consequences. With regard to the possibility that QXIBV could become predominant in a naïve population it is important to evaluate which vaccines could be cross-protective.

REFERENCES

ADZHAR, A., SHAW, K., BRITTON, P., CAVANAGH, D., 1996. Universal oligonucleotides for detection of infectious bronchitis virus by the polymerase chain reaction. Avian Pathol. 25:817-836.

GELB, J., JACKWOOD, M.W., 1998. Infectious Bronchitis. In: The American Association of Avian Pathologists (ed.) Isolation and identification of avian pathogens. 4th ed., AAAP Inc., Kenneth Square, PA, USA, pp 169-174.

GELB, J., ROSENBERG, J. K. R., FRIES, P.A., CLOUD, S.S., ODOR, E. M., DOHMS, J. E., JAEGGER, J. S., 1989. Protection afforded infectious bronchitis virus-vaccinated sentinel chickens raised in a commercial environment. Avian Dis. 33:764-769.

HAYAT, A. M., 1986. Basic techniques for transmission electron microscopy. Academic Press, Inc., New York, USA.

KEELEER, C.L., REED, K.L., NIX, W.A., GELB, J., 1998. Serotype identification of avian infectious bronchitis virus (IBV) by RT-PCR of the peplomer (S-1) gene. Avian Dis. 42:275-284.

WORTHING, K.J., SAVAGE, C.E., NAJLOR, C.J., WIJMENGA, W., JONES, R.C., 2005. An RT-PCR survey of infectious bronchitis virus and avian pneumovirus in Europe between 2002 and 2005. Page 262 in Proc. 14th World Vet. Poultry Congr. Istanbul, Turkey.