

# FALSE APPEARANCES: a case history of bovine viral diarrhoea

## Alex García Ramírez



### Veterinary Practitioner, Spain

Alex is a veterinary surgeon since 2008. He studied both Veterinary Medicine and his master program Milk Production in Santiago de Compostela University.

This clinical case began as almost all of them in our profession do, with a call from a farmer on 10 April 2018, asking about a problem.

During our conversation, the farmer told us the following:

*"We have an outbreak of pneumonia, many animals have a fever"*

*"The animals are ill, they have some kind of virus"*

*"We've had a significant drop in production"*

As veterinarians, a part of our work on this farm is to protect animal health, and so we needed to tell the farmer if there really was some kind of virus circulating through the stables.

On 13 April we visited the operation to analyse the situation. It was a dairy cow farm with approximately 100 cattle, of which about 60 were milking cows. The stables were open, and the heifers were used to repopulate the same operation. The facilities were modern and suitable for the animals; there were sand cubicles and the lots were grouped into lactating and dry cows. There were two calving sheds and suitable accommodation for newborn animals and the stables for the dry cows were located close by. The animals were only vaccinated against infectious bovine rhinotracheitis (IBR).

The main problem the farmer told us about was the perception that the animals were unhealthy, eating less than usual, and had poor coat condition. There had been a decline in production and they were already treating four cows for pneumonia which had been diagnosed by a veterinary clinician.

During our visit we reviewed the results of the periodic blood analysis for bovine viral diarrhoea (BVD), IBR, and *Neospora* with the farmer. As well as the results from the milk tank from the previous few years:

2016				
ID	Date	BVD Ac P-80	IBRgE ELISA	<i>Neospora</i>
9796	15/12/15	Negative	Negative	Negative
3513	15/12/15	Negative	Negative	Positive
6292	15/12/15	Negative	Negative	Negative
7082	15/12/15	Negative	Negative	Negative
7765	15/12/15	Negative	Negative	Negative
7080	15/12/15	Negative	Negative	Negative
1739	15/12/15	Negative	Negative	Negative
7769	15/12/15	Negative	Negative	Negative
7770	15/12/15	Negative	Negative	Negative
7778	15/12/15	Negative	Negative	Negative
1755	15/12/15	Negative	Negative	Negative
7759	15/12/15	Negative	Negative	Positive
7085	15/12/15	Negative	Negative	Negative
3512	15/12/15	Negative	Negative	Negative
7754	15/12/15	Negative	Negative	Negative
3509	15/12/15	Negative	Negative	Negative



2017				
ID	Date	BVD Ac P-80	IBRgE ELISA	Neospora
7778	8/2/17	Negative	Negative	Negative
7765	8/2/17	Negative	Negative	Negative
7769	8/2/17	Negative	Negative	Negative
1764	8/2/17	Negative	Negative	Negative
1750	8/2/17	Negative	Negative	Negative
8394	8/2/17	Negative	Negative	Negative
1897	8/2/17	Negative	Negative	Negative
8398	8/2/17	Negative	Negative	Negative
3893	8/2/17	Negative	Negative	Negative
3887	8/2/17	Negative	Negative	Negative
8381	8/2/17	Negative	Negative	Negative
8374	8/2/17	Negative	Negative	Negative
8399	8/2/17	Negative	Negative	Negative
8405	8/2/17	Negative	Negative	Negative
8413	8/2/17	Negative	Negative	Negative
8406	8/2/17	Negative	Negative	Negative
8411	8/2/17	Negative	Negative	Negative
9575	8/2/17	Negative	Negative	Negative

2018				
ID	Date	BVD Ac P-80	IBRgE ELISA	Neospora
8411	14/2/18	Negative	Negative	81 positive
1896	14/2/18	Negative	Negative	Negative
1897	14/2/18	Negative	Negative	Negative
9579	14/2/18	Negative	Negative	Negative
9582	14/2/18	Negative	Negative	Negative
9583	14/2/18	Negative	Negative	Negative
2127	14/2/18	Negative	Negative	Negative
9584	14/2/18	Negative	Negative	Negative
9585	14/2/18	Negative	Negative	Negative
9586	14/2/18	Negative	Negative	Negative
1907	14/2/18	Negative	Negative	Negative
1908	14/2/18	Negative	Negative	Negative
1917	14/2/18	Negative	Negative	Negative

At first, we suspected a respiratory syndrome problem because the results did not indicate any seroconversion and were very recent—from just two months before. We convinced the farmer to wait for the onset of symptoms in another animal so that nasal swab samples could be collected. We also took advantage of the visit to check the food silos because a particular grass silage deposit that appeared to be in a very poor state of conservation drew our attention. We recommended the farmer speak with their nutritionist because this could have been another cause of the fall in production.

When we were about to leave the farm, the farmer mentioned having recently purchased two heifers close to calving. A part of our work providing animal health protection is to analyse all the animals which enter the holding. Preferably, this should be done before they arrive on the farm, but this rarely happens. Thus, we noted the following biosecurity failures:

- Incorporation of gestating animals without prior analysis.
- Not quarantining animals arriving at the farm.
- Vaccinating for IBR but not for BVD.
- Allowing contact between the young and adult animals.
- Young animals of several different ages were mixed.

We extracted blood from the two purchased animals and left the farm.

We were waiting for the results when the farmer alerted us to the case of a new animal with symptoms.

On 20 April we received the results from the purchased animals.



One was positive for BVD antibodies and the other was positive for the antigen.

When we discussed this, the farmer became angry and blamed these new animals for all the problems on the operation. The farmer believed they had purchased persistently infected (PI) animals which had spread BVD to all their animals. To make matters worse, we were told that the antigen-positive animal had given birth a few days prior and that it had required operation for a displaced abomasum. From the time of the surgery the animal had not improved and had an unremitting fever of 41°C.

After calming the farmer down, we tried to make him understand what we thought may be happening. In principle, the antigen-positive animal had a titre too low to be a PI and so we thought that transient viremia was more likely. We decided to extract blood from the animals in the batch of dry cows stabled with the antigen-positive heifer. We recommend that this animal be kept apart in an isolated area until a second analysis could be completed 21 days later to check if this animal was a PI. The farmer did not follow our advice.

We then discarded the respiratory syndrome hypothesis because of the symptomatology going forwards and because the nutritionist's re-analysis of the grass silage indicated that their initial assessment had been correct— once more showing that appearances can be deceiving.

To conclude the visit, we collected ear cartilage samples from animals recently born on the farm, among them the offspring of the possible PI. On 4 May we received the results:



We went quickly to the farm to tell the farmer that there had been an outbreak of BVD. Of seven tested animals, four were antigen positive, the two oldest calves were about two months old and presented the lowest titre (0.8). The two with the highest antigen values were about three weeks old. The farmer told us that, of these two animals, the one with the highest value had already died; we advised that the other one be sacrificed and that the other two that tested positive should be isolated until a test could confirm if they were PIs. On this occasion, the farmer followed our advice.

The same day, we received the blood test results from the possible PIs, the purchased animals.

The results confirmed that the BVD virus was circulating; we analysed a further 15 animals, and 5 tested positive for BVD antibodies.

The same day we collected ear cartilage and blood samples from the purchased heifer to discard it as a PI. The results came in on 9 May:

**XUNTA DE GALICIA**  
Consellería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
S.X. de Ganadería  
Laboratorio de Sanidade e Producción Animal de Galicia  
Avda. de Madrid, 77, 27002, Lugo, Lugo  
m-lasapaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº.: 2018 / 0000  
Nº. Mostras: 15  
Data entrada: 02/05/2018  
Data comenzo ensaios: 03/05/2018  
Data remate: 08/05/2018  
M. Registro: 2018 / 0000

REMITENTE: ADOSS SANDOAGÁN A Coruña, A Saba nº 3 Cabaleiros, 15983, Tordoa

Identificación	Tipo de mostra	Especie	Motivo ensaio	REGA
561-615	Soro	Bovina	ADSG xeral, IBN con gE	ADSG

**RESULTADOS DOS ENSAIOS**

Mostra	BVD Ac P-40 ELISA	IBRgE ELISA	Neceseros ELISA
501_ES08110079583	Negativo	Negativo	Negativo
502_ES08110079584	POSITIVO: 17	Negativo	Negativo
503_ES08110396377	Negativo	Negativo	Negativo
504_ES01110890380	Negativo	Negativo	Negativo
505_ES03110079579	Negativo	Negativo	Negativo
506_ES08110079586	POSITIVO: 18	Negativo	Negativo
507_ES08110079585	POSITIVO: 19	Negativo	Negativo
508_ES08110079586	Negativo	Negativo	Negativo
509_ES00110509412	Negativo	Negativo	Negativo
510_ES01110508413	Negativo	Negativo	Negativo
511_ES08110079587	NON CONCLUINTE: 47	Negativo	Negativo
512_ES08110079586	Negativo	Negativo	Negativo
513_ES08110079575	POSITIVO: 33	Negativo	Negativo
514_ES08110508411	Negativo	Negativo	Negativo
515_ES07110263468	Negativo	Negativo	Negativo

**BVD Ac P-40 ELISA:** Detección de anticorpos fronte a proteína P-40 do virus de diarrea vírica bovina-enfermidade das mucosas. Negativo =<=0, no concluínte entre 40 e 50 e Positivo >>40

**IBRgE ELISA:** Detección de anticorpos específicos fronte a glicoproteína gE do virus da rinotraqueíte infecciosa bovina (IBR). Uso recomendado para a investigación de vacinas marcadas.

**Neceseros ELISA:** Detección de anticorpos fronte a proteína P-40 do virus de diarrea vírica bovina-enfermidade das mucosas. Negativo =<=0, no concluínte entre 40 e 50 e Positivo >>40

Lugo, a 11 de maio de 2018  
Informe emitido por A responsable do Área: Carmen Elvas Ferreira

**XUNTA DE GALICIA**  
Consellería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
S.X. de Ganadería  
Laboratorio de Sanidade e Producción Animal de Galicia  
Avda. de Madrid, 77, 27002, Lugo, Lugo  
m-lasapaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº.: 2018 / 0000  
Nº. Mostras: 1  
Data entrada: 08/05/2018  
Data comenzo ensaios: 09/05/2018  
Data remate: 10/05/2018  
M. Registro: 2018 / 0000

REMITENTE: ADOSS SANDOAGÁN A Coruña, Tordoa

Identificación	Tipo de mostra	Especie	Motivo ensaio	REGA
561	Orela	Bovina	ADSG xeral, BVDco: soro confirmación, soro a orrela, ADSB	ADSG

**RESULTADOS DOS ENSAIOS**

Mostra	BVD Ac ELISA
501_ES08110079587	Negativo

**BVD Ac ELISA:** Detección de anticorpos fronte a proteína P-40 do virus de diarrea vírica bovina. Prova para a detección de animais inmunizantes permanentemente infectados (PI ou PI+)

**BVDco: soro confirmación, soro a orrela, ADSB:** Detección de anticorpos fronte a proteína P-40 do virus de diarrea vírica bovina. Confirmación e evidencia dos permanentemente infectados (PI). Puntos >>0.5

Lugo, a 11 de maio de 2018  
Informe emitido por A responsable do Área: Carmen Elvas Ferreira

**XUNTA DE GALICIA**  
Consellería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
S.X. de Ganadería  
Laboratorio de Sanidade e Producción Animal de Galicia  
Avda. de Madrid, 77, 27002, Lugo, Lugo  
m-lasapaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº.: 2018 / 0000  
Nº. Mostras: 1  
Data entrada: 09/05/2018  
Data comenzo ensaios: 10/05/2018  
Data remate: 15/05/2018  
M. Registro: 2018 / 0000

REMITENTE: ADOSS SANDOAGÁN A Coruña, A Saba nº 3 Cabaleiros, 15983, Tordoa

Identificación	Tipo de mostra	Especie	Motivo ensaio	REGA
561	Soro	Bovina	ADSG xeral, BVDco: p-40, ADSB	ADSG

**RESULTADOS DOS ENSAIOS**

Mostra	BVD Ac P-40 ELISA
501_ES08110079587	POSITIVO: 32

**BVD Ac P-40 ELISA:** Detección de anticorpos fronte a proteína P-40 do virus de diarrea vírica bovina-enfermidade das mucosas. Negativo =<=0, no concluínte entre 40 e 50 e Positivo >>40

Lugo, a 15 de maio de 2018  
Informe emitido por A responsable do Área: Carmen Elvas Ferreira



They confirmed that it was not a PI, the animal was antigen-negative and antibody-positive.

Therefore, it had a transient viremia which probably occurred when it reached the farm and came into contact with a PI which had been born there. Once again with BVD, the appearances were deceiving, the enemy was already at home and was not the purchased animal.

To conclude the work we started, and following the protocols that govern our work as farm health managers, we checked that the animals with an antigen value of 0.8 were not PIs. We also continued controlling all the births over the following nine months and collected a milk-tank sample for PCR and undertook a BVD antibody analysis. These gave the following results:

**XUNTA DE GALICIA** Consellería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
S.X. de Ganadería  
Laboratorio de Sanidade e Produción Animal de Galicia  
Avenida de Madrid, 77, 27002, Lugo, Lugo  
m-lasapaga.mediorural@xunta.gal

**ENAC** ENAC  
ESLABO  
Nº 449 / A. 0317

**INFORME DE RESULTADOS**

Informe nº: 2018 **0000** M. Resultado: 2018 **0000**  
 Nº. Muestras: 1 Data entrada: 23/05/2018 Data consumo ensaio: 28/05/2018 Data remite: 30/05/2018

REMITENTE: **ADGQ SANCHOÁN** A. Sancho nº 3 Cabaloiro 1983 Tardes  
 A Coruña

Antecedentes: Nulo - Negativo

Identificación	Tipo de mostra	Especie	Motivo ensaio	REGA
1	Late de tanque	Bovina	ADGQ seral. BVD PCR en post de leite e late tanque	REGA

**RESULTADOS DOS ENSAOS**

PCR BVD/BD, PE 138M - Identificación de ácidos nucleicos específicos de los virus de la BVD/BD y de la BD mediante RT-PCR  
 Muestras con resultado: POSITIVO

Lugo, a 30 de maio de 2018  
 Informe emitido por O Titulado superior: Angel Luis Martinez Calvo

**XUNTA DE GALICIA** Consellería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
S.X. de Ganadería  
Laboratorio de Sanidade e Produción Animal de Galicia  
Avenida de Madrid, 77, 27002, Lugo, Lugo  
m-lasapaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº: 2018 **0000** M. Resultado: 2018 **0000**  
 Nº. Muestras: 2 Data entrada: 30/05/2018 Data consumo ensaio: 31/05/2018 Data remite: 01/06/2018

REMITENTE: **ADGQ SANCHOÁN** A. Sancho nº 3 Cabaloiro 1983 Tardes  
 A Coruña

Identificación	Tipo de mostra	Especie	Motivo ensaio	REGA
004002	Orde	Bovina	ADGQ seral. BVD seral confirmación, sero e orde, ADGQ	REGA

**RESULTADOS DOS ENSAOS**

Mostra	BVD Ax ELISA
004_000111043884	Negativo
004_000111043885	POSITIVO 1,5

**BVD Ax ELISA:** Determinación de antígeno (BVD) de diáscara virus bovina. Probe para e detección de animais transitorios permanentemente infectados (PI ou PI+)  
 Unha mostra positiva de mostra animal, indica un período de 3-6 semanas, cortizan a existencia do parasitamento infeccioso (PI).  
 Positivo >=3.

Lugo, a 1 de xuño de 2018  
 Informe emitido por O Titulado superior: Mª Isabel Camino Oja

**XUNTA DE GALICIA** Consellería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
S.X. de Ganadería  
Laboratorio de Sanidade e Produción Animal de Galicia  
Avenida de Madrid, 77, 27002, Lugo, Lugo  
m-lasapaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº: 2018 **0000** M. Resultado: 2018 **0000**  
 Nº. Muestras: 1 Data entrada: 23/05/2018 Data consumo ensaio: 28/05/2018 Data remite: 30/05/2018

REMITENTE: **ADGQ SANCHOÁN** A. Sancho nº 3 Cabaloiro 1983 Tardes  
 A Coruña

Identificación	Tipo de mostra	Especie	Motivo ensaio	REGA
002	Late de tanque	Bovina	ADGQ seral. BVDax p80 late, ADGQ	REGA

**RESULTADOS DOS ENSAOS**

Mostra	BVD p80 late
002	48

**BVD p80 late:** Detección de anticorpos anti proteína P80 de diáscara virus bovine-enfermedade das mucosas mediante ELISA de competición.  
 A porcentaxe de infección está relacionada coa probabilidade de ter un animal permanentemente infectado.  
 Unha porcentaxe de infección >=85 indica unha prevalencia aproximada >=9%, 50-80: 5-20%, 20-67: 20-60%, <22: <10% de prevalencia

Lugo, a 31 de maio de 2018  
 Informe emitido por O Titulado superior: Mª Isabel Camino Oja



- The milk-tank PCR was positive, telling us that there were antigen-positive animals on the farm.
- The level of antibodies in the milk tank had decreased with respect to the previous samples, and so, as expected, some animals had seroconverted.
- Finally, and most troubling, was the presence of a heifer whose initial antigen value of 0.8 had risen to 1 after 21 days. By definition, this represented a persistently-infected animal. However, because this was a heifer and the value was so low we decided to perform a third test a few weeks later.

In view of these results, we took blood samples from the entire lactation batch for a pooled PCR, and returned to collect ear cartilage in order to identify any possible PIs and animals that had been born during this period.

The final results arrived today, 26 June 2018.

**XUNTA DE GALICIA**  
Conseillería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
Laboratorio de Sanidade e Produción Animal de Galicia  
Avenida de Madrid, 77. 27002, Lugo, Lugo  
mailto:casasaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº: 2018-10000  
Nº Muestra: 02  
Fecha entrada: 21/06/2018  
Fecha entrega muestra: 23/06/2018  
Fecha emisión: 23/06/2018

**REMIENTE**  
ASO SINDOOLAN  
A Coruña  
A Balsa nº 3, Cabaloira, 15803, Tordes

**MOSTRAS RECIBIDAS**

Identificación	Tipo de muestra	Especie	Motivo envío	REGA
02	Crude	Bovina	ADSG anal. BVD con esta confirmación, oro a prolo. ADSG	ADSG anal. (BVD)

**RESULTADOS DOS ENSAIOS**

Muestra: BVD Ax ELISA  
02\_15012314\_00001 Negativo

**BVD Ax ELISA**. Determinación de antígeno (virus) de diarrea vírica bovina. Prueba para a detección de antígenos inmunolaboratorios persistentemente infectados (PI ou PI<sup>+</sup>).  
Usar mostras positivas do mesmo animal, obtidas con intervalos de tres semanas, continúa a existencia dun persistentemente infectado (PI<sup>+</sup>).  
Positivo >=0.3.

Lugo, a 23 de xuño de 2018  
Informe emitido por: B. Botella superior: Ángel Lois Botella superior

**XUNTA DE GALICIA**  
Conseillería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
Laboratorio de Sanidade e Produción Animal de Galicia  
Avenida de Madrid, 77. 27002, Lugo, Lugo  
mailto:casasaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº: 2018-10000  
Nº Muestra: 1  
Fecha entrada: 20/06/2018  
Fecha entrega muestra: 21/06/2018  
Fecha emisión: 21/06/2018

**REMIENTE**  
ASO SINDOOLAN  
A Coruña  
A Balsa nº 3, Cabaloira, 15803, Tordes

**MOSTRAS RECIBIDAS**

Identificación	Tipo de muestra	Especie	Motivo envío	REGA
01	Crude	Bovina	ADSG anal. BVD con esta confirmación, oro a prolo. ADSG	ADSG anal. (BVD)

**RESULTADOS DOS ENSAIOS**

Muestra: BVD Ax ELISA  
01\_15012314\_00001 Negativo

**BVD Ax ELISA**. Determinación de antígeno (virus) de diarrea vírica bovina. Prueba para a detección de antígenos inmunolaboratorios persistentemente infectados (PI ou PI<sup>+</sup>).  
Usar mostras positivas do mesmo animal, obtidas con intervalos de tres semanas, continúa a existencia dun persistentemente infectado (PI<sup>+</sup>).  
Positivo >=0.3.

Lugo, a 22 de xuño de 2018  
Informe emitido por: A Botella superior: Nº Isabel Carrero Ojea

**XUNTA DE GALICIA**  
Conseillería do Medio Rural  
D.X. de Ganadería, Agricultura e Industrias Agroalimentarias  
Laboratorio de Sanidade e Produción Animal de Galicia  
Avenida de Madrid, 77. 27002, Lugo, Lugo  
mailto:casasaga.mediorural@xunta.gal

**INFORME DE RESULTADOS**

Informe nº: 2018-10000  
Nº Muestra: 3  
Fecha entrada: 20/06/2018  
Fecha entrega muestra: 21/06/2018  
Fecha emisión: 21/06/2018

**REMIENTE**  
ASO SINDOOLAN  
A Coruña  
A Balsa nº 3, Cabaloira, 15803, Tordes

**MOSTRAS RECIBIDAS**

Identificación	Tipo de muestra	Especie	Motivo envío	REGA
01-001	Crude	Bovina	ADSG anal. BVD con esta confirmación, oro a prolo. ADSG	ADSG anal. (BVD)

**RESULTADOS DOS ENSAIOS**

Muestra: BVD Ax ELISA  
01\_15012314\_00001 Negativo

**BVD Ax ELISA**. Determinación de antígeno (virus) de diarrea vírica bovina. Prueba para a detección de antígenos inmunolaboratorios persistentemente infectados (PI ou PI<sup>+</sup>).  
Usar mostras positivas do mesmo animal, obtidas con intervalos de tres semanas, continúa a existencia dun persistentemente infectado (PI<sup>+</sup>).  
Positivo >=0.3.

Lugo, a 21 de xuño de 2018  
Informe emitido por: B. Botella superior: Nº Isabel Carrero Ojea



- The cartilage results were negative, and so this heifer was not a PI. Once again, appearances are deceptive. We were facing a case of extended-duration viremia, lasting longer than the considered standard of 21 days.
- None of the lactating cows were antigen positive, therefore there were no PIs in the batch and the viremia was overcome.
- The last three animals born on the farm were also antigen negative.

Therefore, we considered the BVD outbreak to be controlled and we informed the farmer.

It is impossible to know with any accuracy how the outbreak started, but the cause was attributed to a failure in biosecurity. This was probably associated with a lack of control during visits which caused an animal in the first third of gestation to contract BVD and it then gave birth to a PI which spread the virus and triggered the outbreak.

Finally, we finish the story as we started it, with a conversation with the farmer. We wanted them to tell us about their understanding of BVD after everything that had happened. These were their words:

*"With BVD, not everything is what it seems"*

*"Biosecurity is the most important thing"*

*"We vaccinate to prevent both the clinical symptoms and the birth of persistently infected animals".*