





FALSE APPEARANCES: a case history of bovine viral diarrhea

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:

		201	6	
ID	Date	BVD Ac P-80	IBRgE ELISA	Neospora
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







		201	7	
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

		201	8	
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.

	inta Galic	A Laboratorio de Sa	Agricultura e Industria nidade e Produción A 17, 27002, Lugo, Lugo		
		INFORME D	E RESULTADOS		d. Resilutre: 2018 VIII
Informe nº.: 2018 300 Nº. Moetrae: 2		Data entrada: 16/04/20	18 Data com		Data remate: 20/04/2018
REMITENTE I DBO SANDOGÁN K Ceruña	A Balan P	3 Cababetres	15683	Tantoia	
ADSTRAS RECIBIDAS Sentificación 05-608	Tipo de mestre Sero	Especie Bovina	Mutive ADGG Ni con	oral, B	EGA
RESULTADOS DOS EI	VSAIOS	_			
Acetre	BVD As ELIBA	EVD Ac P-40 ELIGAc	IDRUE ELIGA	Neospora ELISA	Paratuberculose EL36AJ
00. 100 100 10074	Negativa. POSITIVO. 0.5	POSITIVO. 31 Negative.	Negative.	POSITIVO, 78 Negativo.	Negative.
niectados (PL ou PL) Cas mostras posthas de Instituto >=0.3 IND Ac P-45 ELBAr: De Regelies ==50, np. condu	resens animal, oblides n lectión de anticerpos front na anto 40 e 50 e Poelfo de anticerpos específicos f cines manades.	a darna vitez brita. Poba un intervalo de tres serraras, e á potetra P-80 do virus da o, co40 hunte a glasproteíra gE do v	conferrar a osistancia d darma virka bovina-ord	un persidentemente infecto ermediade das mutoses.	de (PI).
isospeta ELISA: Deterre	nación de anticorpos Port egativo, ambre 30 e 40 non				
aratubercutoen ELIBAI	Determinación de anticom	es fronte o Mycolaschekam pa ran conduinte, >=55 poetivo		soko.	
1.15					





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:

		NECESSIE OF BE	TADOS	
Marma at, 2018 22	ina"	INFORME DE RE	and the owner.	M. Residen: 2018 21345
V ¹ , Montros: 7		Bala antirada: 02/05/2018	Data comeso emadoa: 12/05/2	
eswettenite Ideo-biectosike I Garufa	A Balance services	ra Calubria da		
MONTRAS RECIBICAL				
016-622	Tipo de mantes Orada	Experie Bostus	Badher ansate ADBD renat. Briden para anda ADBD na auritmasian	-
MERLIN, TADOS DOS ET	NAMO			
		IND ALCURA		
Logical Concession		PORTVO 1.8		
The local division of		POSTING 1.8		
NORS		POSTNO. 1.8		
12, tapeto cris		Negative.		
a diama and		PO875VG-1.8		
12,000000		Supplies.		
Heritative (Pl as Pl)			a defendar de provata insuralidades para	
Dise resting problem it		Luga, a 4 de ma		
Nas realise prolition it		Logo, a 4 de ma me emilido por A responsable :		
Nas realize prolition it				
Nas realize prolition it				
Line receives problem it				
Nas realise prolition it	-			
Zoan menting partition in Presting 1982, 5		ne milita po A requirada	de lans: Carmen Eline Fermine	
Data manta puntan in Papata rel().		ne enlide pr & separade	de lanes Carman Eines Famérie Internet la coste coltes co des rep	
Data menting perform in Practice rel().5		ne endez por A responsable determination de la construcción de la construcción de la construcción de la cons	de lanes. Cannan Elinas Faméria Malanana la malan militar de la malan Nationale de la malana militar de parameter Nationale de la malana mol	artis copis suitade



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 Pls. On this occasion, the farmer followed our advice.

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

	nta Galic	S.X. de Gandaria Laboratorio de San Avda. de Madrid, 77 rm-lasapaga.medio	7, 27002, Lugo, Lugo		
Informe n*.: 2018 Auto		INFORME DE	RESULTADOS		Id. Rexistro: 2018 2000
Informe nº.: 2016 Made Nº. Mostras: 15		Data entrada: 02/05/201	8 Data con	nezo ensalos: 03	05/2018 Data remate: 05/05/2018
REMITENTE ADGG SANDOGÁN A Coruña	A Balan r	3 Cabaleiros	15683		Tordola
MOSTRAS RECIBIDAS		Visiones			12121
dentificación 501-615	Tipo de mostra Soro	Especie Bovina	Mathe ADSG IBN c		REGA
RESULTADOS DOS ENS	IAIOS				
Mestra		EVD Ac P-80 ELISAc	IBRgE ELISA	Neospora 8	ELISA
501_ES061110679583		Negative.	Negativo.	Negativo.	
902 100 1771		POSITIVO, 17	Negative.	Negativo.	
503_E8051110386377		Negativo.	Negativo.	Negativo.	
504_530111098833600		Negativo.	Negativo.	Negativo.	
505_ES031110679579		Negativo.	Negativo.	Negativo.	
505 Managaran 556		POSITIVO, 18	Negativo.	Negativo.	
507_ 3000000000 6255		POBITIVO. 18	Negativo.	Negativo.	
508_E5081110679585		Negativo.	Negativo.	Negativo.	
505_E6001110508412		Negativo.	Negativo.	Negativo.	
510_ES011110508413		Negativo,	Negativo,	Negativo.	
511_ theorem1 73687		NON CONCLUINTE, 47	Negativo.	Negetivo.	
512_E5091110879586		Negativo.	Negativo.	Negativo.	
513 _100000000 0575		POSITIVO, 33	Negativo.	Negativo.	
514_ES091110508411		Negativo.	Negativo.	Negativo.	
515_E5071110083408		Negativo.	Negativo.	Negativo.	
BVD Ac P-80 EUBAc: Dete Negativo >=50, no conduint		te à proteina P-80 do virus da o vo <=40	lama virka bovina-an	fermedade das mut	25684.
BRgE ELISA: Detección de terts a investigacion de veci		fronte a glicoproteina gE do vin	us de rinotraquelte infe	ociosa bovina (IBR)	. Uao recomendado

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:

informe of,: 2018 (ma	•	INFORME		ADOS.		statre: 2018	
REMITENTE ADES BANDOSÁN A CHUMA	-		-		Torminie		
VOSTRAS RECIBIDAS Ventificación EDI-	Tipo de insulte Crolla	Espeix Inite		Motive ensails ADSD work DvDax solo continues acro + craftis, ADSD	REDA		
RESULTADOS DOS EN	SAIOS						-
Mastra 101_ 101004 D4074		IIVD Ax ELIBA Negative.				_	-
rhedados (PL ou AP); Suos montras positivos do Toettivo ++0.3	neens annal, dallas i	can internado de tres seman	tas, torðirtari a at	odensia ituri pervidenten	erte infectado (PI)		-
	liefue	Lugo, a 1 me emitido por A respo	11 de maio de 2 mable de área:				
.⊕. XU	NTA		Nedis Rural (k. Agricultura e				
	NTA GALIC	Conselleria de l D.X. de Gandari S.X. de Gandari Laboratorio de l	ta, Agricultura e la Sanidade e Prov	Industrias Agroalment Industrias Agroalment	ertes de		
UE	NTA GALIC	Conseilleria do I D.X. de Gandari D.X. de Gandari D.X. de Gandari Laboratorio de I Auda. de Madrie rm-lacapaga.me	ts, Agriculturs e Is Seridade e Pro 5, 77, 27002, Lug sdiorural@nurta	gal	atas da		
informe n°o 2016 2000		Conselleria de l D.X. de Gandari S.X. de Gandari Auda. de Madrid Auda. de Madrid mi-lasacaga.me	ta, Agricultura e la Senidade e Prov 6. 77. 27002, Lug diorural@nurta (DE PELSUL.T/	gal ADOS	M. Re	darei 2018 -	
Informe nº., 2016 Nº. Mostraxi 1 REMITENTE IOSO SANDOGÁN	•	Conseilleria da 1 D.X. da Gandari D.X. da Gandari A.S. da Gandari Ada. da Matric m-Iasapaga.ma INT-UHONE Data entrata: 00055	ta, Agricultura e la Senidade e Prov 6. 77. 27002, Lug diorural@nurta (DE PELSUL.T/	gal	M. Re		
Informe n°. 2018 N°. Montraxi 1 NY. Montraxi 1 No. 1 N	A Juna e Marcha	Consellente de l D.X. de Ganden D.X. de Ganden D.X. de Ganden D.X. de Ganden D.X. de Ganden D. de Ganden M. de Ganden De Gandenstein De Gande	(a. Agricultura e la Banidade e Prov 6. 77, 27002, Lug ediorunalĝiounda (2018 0	gal ADCIS. uto correco anastos: '	M. Re 10/05/2018 Data Textura		
Informe #1, 2018 Ph. Meetraxi 1 IEMITENTE LOSIS SANDOGAN LOSIS MOSTINAS RECENDAS MOSTINAS RECENDAS	•	Conseilleria da 1 D.X. da Gandari D.X. da Gandari A.S. da Gandari Ada. da Matric m-Iasapaga.ma INT-UHONE Data entrata: 00055	(a. Agricultura e la Banidade e Prov 6. 77, 27002, Lug ediorunalĝiounda (2018 0	gal ADOS	M. Re 10/05/2018 Deta		
Informe nº., 2018 . Nº. Mostraxi 1 REMITENTE	e A bette e terrette Tipo de mustre Serv	Consellente do 1 D.X. de Ganden M.X. de Ganden M.X. de Ganden M.X. de Ganden M.K.	(a. Agricultura e la Banidade e Prov 6. 77, 27002, Lug ediorunalĝiounda (2018 0	gal ALICOS uto correcto emaslos: Methro emaslo ACIECI areal.	M. Re 10/05/2018 Data Tentina REGA		
Inferme II*. 2018	e A bette e terrette Tipo de mustre Serv	Consellente do 1 D.X. de Ganden M.X. de Ganden M.X. de Ganden M.X. de Ganden M.K.	ta, Agricultura e la Santidate e Proc 6, 77, 27002, Lug adorural@inurta Otti PELSUL.T/ (2016 D 15885	gal ALICOS uto correcto emaslos: Methro emaslo ACIECI areal.	M. Re 10/05/2018 Data Tentina REGA		
Informe #1, 2018 / Pr. Meditars 1 REWITENTE LOUGH AND AND Conde MOSTARS MECHADAS MERICAN MERICA	A Balan or mercedua Tipo de mostra Eero SANDS	Consellents de la Diff. de Cantaria B.C. de Cantaria B.C. de Cantaria B.C. de Cantaria B.C. de Cantaria Indecendra de Cantaria Des entrustas Contró de Cantaria Des entrustas Des ent	ta, Agricoltura e la Santiada e Proc. X. 77, 27002, Lug distrutadorral@procta. OPL PEUSUALTI 20205 0 13083	gal <u>AbCOS</u> Ités convecto ensuites: ' Moltre ensuite ADEIS aveit, BYCBe: p40, ADEIS	M. Re 1005/2018 Deta Textuse		
Norme P. 2018 P. Mastras 1 RENTFIC Course	A Balan or mercedua Tipo de mostra Eero SANDS	Consultante de la Consultante	ta, Agricoltura e la Santiada e Proc. X. 77, 27002, Lug distrutadorral@procta. OPL PEUSUALTI 20205 0 13083	gel ADCUS uto convecto estadate: Methor estado ACIEI and, MCSec 201, ACIES With a estado estado Nota estado estado Nota estado estado	M. Re 1005/2018 Deta Textuse		-





They confirmed that it was not a PI, the animal was antigennegative 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 Pls. 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:

leturma nº.: 2010 De		LISC MOUTHE	NE PIERVE	ADOS	M. Havistre: 2010 Judy	
Nº. Moatras: 2	-	Data entrada: 30/05/	2018	Data cometo anasina: 31/05	0018 Data remate: 01/08/2018	-
REMITENTE NDRO EANDOGÁN N Garafa	A Status of	13 Cabalative	15685	5	***	
NOSTRAS RECIBIOAS Antificación D4-520	Tipo do resulto O vila	Raparia Bestra		Mattro essala ADBO seni, Br/Dar anto sonfernación, auro e crolla, ADBO	REAL Second Second	
REBULTADOS DOS S	NSAIOS					
Hautre 104_ESOB1112043884		EVD As ELISA Negetivo				-
interesting dis		POSITIVO, 1.8				
lain bhairne ross gineiltin eile sattaith sette. Tanais portion	fore inpresents, a autoritation for a representation prevail test	fe selli gararitiade pelo vidigi i liccorarile ter attriventer i	- de verffinselder, e		analati. ar antis sega sananka	
ide blying tor jirchy site structure To Tanis public	Ann Hattantin, e admitting In a represente privation als informa de resollation re s	fir nilli garachlada polo sinig e linacearle, iar aidiriteachr i regerie antarais. Mas frai	e de verffissolder, e organise a por etail 14. conto gatinante 1100 de contente de	hda auf, a fahradark goda proposite 6 teatr bilar pilora. Serad a Poschadra, agar 80 teatr bilar (8 terrar agar	ar inta ingia saturda	_



5



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.

INFORME DE RESULTADOS

Lugo, s 32 de saño de

The final results arrived today, 26 June 2018.

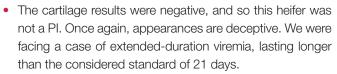
	INTA GALICI	A Laboration of	Hade And ris, Agriculture ris Banistati e Pr 4, 71, 27952, 1 mbrocalijon	e houarnas Agroadmantaria adaptitos Antonal do Dadicio agro Logo Agad	EN	AC
		INFORME	DE RESUL	18005		
Anderson of 1, 2018 - 40 Nº, Mentras: 53	-	Bata entirada 240	10214	Data company magnetice, 2010	B. Rectains 277 10279 Data winds 20	
epertexts scool sectorale in parate	A Salar (*)	Determine				
NORTHAN RECEIPTING						
Bard Reaction Sci-4520	Type do martino Terra	Botta		Rafts mails BUC PCR as peri to any ADD1_any	-	
87-480	Data turna resoltes cartectoria					
NEBLA TADOS DOS 5	NAMON .					
		inter approximation in the		No yor to be readered with the	10	
		Logo, e	10.00 to 00	and and Lon Martines Indents		

40.1		NL18008
Realized 1	Bala antiquite MURICIPAL	a factors 211 mgs
erevite o Androdani rufa	1.545 - 7.5 Same - 100	tons.
CALLECTRIAN Realty System ST Date	-	Alter and Alter
ILLINDON DOS ENBANDE		
	80.0.0.00	
Photo dia dia mandri dia dia dia dia dia dia dia dia dia di	supro.	
Pest ille commune	hugetus.	





XUNTA DE GALICIA



- 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:

) Boehringer Ingelheim

"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".



