Cases of acute respiratory distress in batches of Charolais beef calves, straightforward - but only in appearance!

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FARM CONTEXT

Our case takes place in the Nièvre department, in the heart of the Charolais basin. The farm is a breeder-fattener of Charolaise cattle. We will focus on the fattening unit where the respiratory problems appeared.

The farmer has a building with 8 pens with straw bedding and a feed fence that can accommodate between 45 and 50 beef calves (approximately 10 -11 months of age when brought in). The conditions of the environment, bedding and feeding were all found to be adequate. There was no overcrowding in the pens or in the barn. The animals come either from a livestock assembly centre or from one of two Nièvre farms, with which the farmer is used to working, and they are gradually introduced into the barn pen by pen. The animals are not reallocated upon entering the barn.

The beef calves are vaccinated (Nasym®, Bovilis Bovigrip®, Hiprabovis Somni®), with antibiotics, NSAIDs and parasiticides also being given upon entry. The second injection of the various vaccines did not take place.

CASE REPORT

On December 2, 2019, the young bulls in pen number 8 began to present a drop in condition, lowered heads, dyspnoea, sudden anorexia and hyperthermia (39-40°C). In the light of the clinical signs and context, we directed our diagnosis towards collective respiratory diseases. Our differential diagnosis included bacterial bronchopneumonia, viral pneumonia and lungworm (Dictyocaulosis). Our objective was to bring down the fever (flunixin (Finadyne®)) and manage any bacterial infections. We therefore recommended the farmer to carry out a collective and metaphylactic treatment (tulathromycin (Draxxin®)) which would be curative for those already affected and preventive for animals at risk.

After 3 days of treatment, the farmer did not notice any improvement in the clinical condition of the animals. Furthermore, animals in pens 2 and 7 began to show clinical signs similar to the animals in pen 8, with marked hyperthermia (40-41.9°C). A first animal in pen number 2 was suddenly found dead, having shown signs of acute respiratory distress 2 hours before his death. We performed an autopsy that concluded that death was caused by peracute respiratory impairment (lesions: acute interstitial pneumonia of the cranial lobes, oedema and interstitial emphysema of the caudal lobes) of infectious origin (RSV). In view of the sudden death and the inefficacy of the treatment, lung and spleen samples were submitted to the diagnostic laboratory (LVD) for bacteriological culture (including Mycoplasma) and sensitivity testing.

Pending the laboratory results, a new metaphylactic treatment was put in place for pens number 2, 7 and 8: a combination of florfenicol and meloxicam (Zeleris®).

On December 7, 2019, the breeder called us for two beef calves with mucopurulent nasal discharge, severe dyspnoea, persistent anorexia, high hyperthermia (40°C) and very marked lethargy. We decided to carry out a last-resort treatment using marbofloxacin and flunixine. A request for bacteriological and virological investigation on deep nasal swabs was sent to the LVD.

Following this episode, the situation was reviewed: sudden, severe clinical signs instead of vaccination, and treatments provided proven to be ineffective. This led to the question of a possible underlying cause. That is why we decided to carry out an investigation for BVD by RT-PCR (virology). BVD investigation was not mandatory prior to January 1st, 2020, in Nièvre.

On December 11, 2019, the results became available for the first animal: in the lungs, Mannhemia haemolytica, Histophilus somni, Biberstenia trehalosi and Escherichia coli as well as RSV were identified [Annex 2]. Culture and sensitivity testing of B. trehalosi revealed resistance to macrolides and to aminoglycosides but sensitivity to other antibiotic families [Figure 2]. Possible cross resistance in the family of macrolides can explain the ineffectiveness of the treatment with tulathromycin.

Germe identifié : Bibersteinia trehalosi

Prélèvement : Poumons

Antibiotiques	Interp. (*)			Diamètres mesurés (mm)	Diamètres critiques (mm)
	S	I	R		
* AMINOSIDE					
GENTAMICINE (10 UI) (past)	X			18	14-16
SPECTINOMYCINE			X	15	20
STREPTOMYCINE (10 UI)			X	6	13-15
* BETA-LACTAMINE					
AMOXICILLINE + ACIDE CLAVULANIQUE (Gram -)	X			32	14-21
* CEPHALOSPORINE					
CEFQUINOME 30 µg	X			28	19-22
CEFTIOFUR	X			30	18-21
* LINCOSAMIDE					
LINCOMYCINE			X	8	17-21
* MACROLIDE					
TILMICOSINE			X	10	12-15
* PHENICOLE					
FLORFENICOL (past)	X			27	15-19
* QUINOLONE					
ACIDE NALIDIXIQUE	X			20	15-20
DANOFLOXACINE (past)	X			25	17-22
ENROFLOXACINE (past)	X			25	17-22
MARBOFLOXACINE (past)	X			27	15-18
* SULFAMIDE					
TRIMETHOPRIM + SULFAMETHOXAZOLE	X			28	10-16
* TETRACYCLINE					
TETRACYCLINE	X			25	17-19

(* S : sensible - I : intermédiaire - R : résistant)

INTERPRETATION :
Interprétation de tétracycline valable pour oxytétracycline et chlortétracycline
Interprétation de SXT valable pour les autres associations triméthoprime-sulfamide.

Figure 2

On December 13, 2019, the BVD virology of two calves returned positive for both animals. However, it is impossible to know whether these animals are PI or simply transient viraemic. Nevertheless, we can conclude that there is viral circulation on the farm. Furthermore, bacteriological and virological analyses resulted in the identification of RSV, PI3, Coronavirus, Pasteurella and Mycoplasma [Annex 2]. This confirms the circulation of respiratory viruses on the farm which could be correlated to incomplete vaccination protocols and to the fragility of individuals due to the BVD virus.

From December 13, 2019, several metaphylactic treatments were carried out by the farmer in several pens.

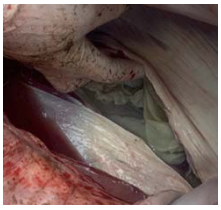
On December 21, 2019, after the farmer informing us of treatment failure, we decided to perform a new autopsy on a beef calf that had died on that day and that had presented signs of respiratory distress which had become chronic 10 days earlier. The post-mortem examination revealed significant findings:

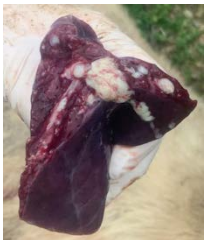
Thoracic cavity: absence of pleural vacuum and large amounts of cloudy, opaque liquid

Pleura: lamellar fibrosis accompanied by fibrin strands and pericardial adhesions.

Pericardium: modification of the surface appearance with thickening of the pericardium and the epicardium by a whitish fibrous tissue.

Lungs: increased consistency, in particular of the cranio-ventral lobes. Heterogeneous consistency with heterogeneously coloured lobules. Pus visible upon cutting and pressing, with gey, sclerotic lobules and presence of abscesses





In conclusion, we found progressive suppurative pleurisy and suppurative bronchopneumonia, probably due to Pasteurella. Bacteriological and virological analysis revealed *Escherichia Coli*, *Pasteurella multocida* and *Mycoplasma*, which confirms the hypothesis. However, subsequent analyses showed that the RSV was still circulating on the farm [Annex 2] and that a majority of the animals tested were positive for BVD (virological test).

DISCUSSION AND CONCLUSION

In total, the farmer lost 22 animals throughout the barn over a period of approximately 1 month. The impact on the ADG of the affected batches was considerable (weight loss ranging from 5 to 64 kg, i.e. a negative ADG of -1324 g per box). The situation also generated a lot of costs, including costs of veterinary consultations, treatment, diagnostic tests, post-mortem examination as well as losses due to mortality (almost € 95 per calf on average, compared with around € 15 in previous years). In view of the critical situation of the farmer, a board of experts including veterinarians, the GDS and laboratory representatives, met on January 9, 2020. The final decision was to carry out BVD vaccination of the next incoming batches.

On January 13, 2020, the situation was follows:

- The farmer will try to have the batches vaccinated against respiratory pathogens before their arrival (i.e. on the farms of origin from where he usually buys in stock)
- The beef calves coming in from the livestock assembly centre will be transported as fast as possible to the farmer (reducing their time spent in the centre)
- The farmer will remove cattle from the problem batches and vaccinate the remaining animals against the BVD virus.

We also gave him the following recommendations:

- Carry out intranasal vaccination with Rispoval® upon entry into the barn for batches coming from the assembly centre, in addition to Bovilis Bovigrip: immunity against RSV will be acquired more quickly (theoretical time for establishing immunity according to the SPC: 5 days)
- Decrease the intervals of introducing animals

In this case, knowledge of the BVD status of the farms of origin of the beef calves, or the guarantee that none of them was a PI animal would have avoided introducing PI or transient viraemic animals. This would have limited the number of cases, the severity of the clinical signs, and the number of deaths and would not have caused such dramatic economic losses. Here, the BDV virus really acted as an aggravating agent on a generally well-managed farm.

APPENDIX

Vaccines and "preventive" medicines administered to the animals

Barn number	Number of animals	Entrance date	Origin	Vaccines administered BEFORE arrival		Vaccines and medicines administered at the time of arrival								
				IN vaccine		IN vaccine	Vaccine - intramuscular route					Antimicrobials			Anti-inflammatory drug
				live RSV	live PI3	live RSV	Inactivated RSV	Inactivated PI3	M.haemolytica	M.haemolytica	H.somni	Oxytétracycline	Tulathromycine	Florfénicol	Meloxicam
2	45	22/11/19	breeder 58												
3	45	05/11/19	breeder 58												
4	45	23/10/19	breeder 58												
5	47	06/11/19	Livestock assembly center												
6	48	13/11/19	Livestock assembly center												
7	49	20/11/19	Livestock assembly center												
8	45	27/11/19	Livestock assembly center												
8 bis	35	27/11/19	Livestock assembly center												

Sampling date	Animal	Sample type	Test requested	Specific tests	Date Results
06/12/19	9675	lung	Bacteriology	Culture	11/12/19
06/12/19	9675	lung	Bacteriology	Sensitivity testing	11/12/19
06/12/19	9675	viscera (spleen)	Bacteriology	Culture	11/12/19
06/12/19	9675		**Autopsy**		06/12/19
06/12/19	9675	viscera	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	13/12/19
06/12/19	9584	deep nasal swab	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	13/12/19
07/12/19	9546 + 3290	deep nasal swab	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	13/12/19
07/12/19	9546 + 3290	EDTA blood	BVD screening plan	PCR BVD Ind	13/12/19
21/12/19	8245		**Autopsy**		21/12/19
21/12/19	8245	viscera	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	30/12/19
21/12/19	8245	lung	Bacteriology	Bacteriology (culture)	27/12/19
24/12/19	9597 + 9165 + 9708	deep nasal swab	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	30/12/19
24/12/19	9597 + 9165 + 9708	whole blood	BVD screening plan	RT PCR BVD whole blood	03/01/20
24/12/19	9732	whole blood	BVD screening plan	RT PCR BVD whole blood	03/01/20
24/12/19	505	deep nasal swab	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	30/12/19
24/12/19	505	whole blood	BVD screening plan	RT PCR BVD whole blood	30/12/19
24/12/19	1001	whole blood	BVD screening plan	RT PCR BVD whole blood	30/12/19
24/12/19	9609	lung	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	30/12/19
24/12/19	9584	lung	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	30/12/19
24/12/19	9097	lung	Respiratory PCR package + 7 pathogens	PCR RSV, PCR PI3, PCR P.Mult, PCR M.hae, PCRHISTO, PCR-MYCO, PCR	30/12/19

Annex 1: All ancillary investigations carried out (in the form of an overview table)

	Pathogens identified							BVD virology (ind RT-PCR on blood)
Animal no.	RSV	PI3	*P. multocida*	*M. haemolytica*	*H. somni*	*M. bovis*	ovine Coronaviruse	Results
9675	D	nd	nd	D	D	nd	nd	
9584 (1)	nd	nd	D	D	D	D	D	
9584 (2)	nd	nd	D	nd	nd	D	D	
9546	D	D	D	nd	D	D	D	D
3290	D	D	D	D	D	D	D	D
8245	nd	nd	D	nd	nd	D	nd	
9597	D	nd	D	D	nd	D	D	D
9165	nd	D	nd	nd	nd	D	nd	nd
9708	nd	D	D	nd	nd	D	nd	D
9732	nd	nd	nd	nd	nd	nd	nd	D
505	nd	D	D	D	D	D	D	D
1001	nd	nd	nd	nd	nd	nd	nd	D
9609	D	D	nd	nd	nd	D	nd	
9097	nd	nd	D	D	nd	D	nd	

(1) deep nasal swab on 6/12 (2) lung on 24/12 D = "Detected" = detection of the genome
nd = "not detected" = no detection of the genome

Annex 2: Results of bacteriology and BVD screening (in the form of an overview table)