Case report: Impact of BVD vaccination on health and economics at a rose-veal farm with Bovine viral diarrhea virus circulation.

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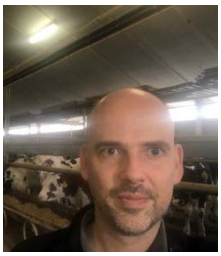

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ABSTRACT

Bovine viral diarrhea virus (BVDV) has a significant impact on health, antibiotic use and economics in the rose-veal industry. Nevertheless there hasn't been a publication of a case that describes the impact of BVD vaccination on health, antibiotic use and economics at a rose veal farm with Bovine viral diarrhea virus circulation in the Netherlands. Because of the national BVD control program for dairy farms in The Netherlands, the number of sentinel animals increases and therefore the chance of a clinical BVD outbreak amongst veal calves. The reason would be an increased number of seronegative calves and co-mingled with persistently infected /transient infected calves onto rose veal calf farms. BVDV is known to be the most frequent isolated virus in relation to bovine respiratory disease (BRD). By reducing BVDV circulation in rose veal herds the incidence of BRD decreases. Therefore, BVD vaccination of veal calves could reduce the impact of BVDV on health and economics at the rose veal calf farm. Through vaccination of rose-veal calves, in the first week of arrival with a live BVDV vaccine (Bovela©, Boehringer Ingelheim) the antibiotic use decreased with 4,88 ADD (animal daily dose) and the mortality decreased with 2,77 %. This resulted in an economic benefit for vaccinated rounds of 5,66€/rose veal calf, compared to rounds that were not vaccinated on the same farm. The average slaughter weight was 1,84 kg less for the vaccinated rounds. If corrected for 1,59 less growing days for the vaccinated rounds the difference in slaughter weight is even smaller. Therefore, this difference is considered not biologically relevant and can be caused by different factors, but it does influence the financial results.

Bovine viral diarrhea virus (BVDV), first described in the 1940s (1), has a great impact on the cattle industry worldwide. In the Netherlands a screening program for the prevalence of BVDV in the Netherlands on different types of farms was conducted (Specific monitoring 2015-2016) The prevalence of BVDV circulation on veal farms (white and rose) was suggested to be 59% (CI 49,568,0) (3). In another study the prevalence was estimated 93% of the herds; with 58% of the calves being sero-positive (5), these results demonstrate that that BVD is a big issue in the veal industry (3,6). On a veal farm, calves are purchased from many different dairy farms after been sorted in a collection centre. This means that the risk of introducing a persistent infected calf or transient infected calf is higher compared to dairy farms (4). Other risk factors of introducing BVDV could be herd size, region, visitors and hygienic control measurements.
In cases of bovine respiratory disease (BRD), which is the main health problem in the rose veal sector, the most frequent isolated viral component is BVDV (6,7). By controlling BVDV on a rose veal farm, you could reduce the risk of BRD. The best way to prevent is NOT to buy persistent or transient infected calves. For now, this is not an option for this farm for economic reasons. Therefore, vaccination of the herd is the best way to control the damage done by BVDV on this farm.

FARM DESCRIPTION

A well-maintained and good managed farm, housing 40 dairy cows and 900 rose-veal calves, located central in The Netherlands. The dairy cows are housed separately and are vaccinated against IBR en BVD. A different veterinary practice is responsible for the healthcare of the dairy herd.

The rose veal are housed in three units separated from each other. One unit is used to rear the calves from 2-12 weeks of age; the other two fattening units are used for housing calves from 12 weeks until slaughter (36 weeks). Every unit contains 300 calves, all originated from The Netherlands. Within one week, all 300 calves (one round) arrive in the rearing unit. No vaccinations were used in the past, but the calves were monitored by blood samples each year (cross-sectional) or when problems did occur (double paired with 4-6 weeks interval). The blood samples were investigated with an ELISA test for the most common-known pathogens with a relation to BRD: Bovine respiratory synctical vrius (BRSV), Bovine Herpes virus (BHV), Bovine viral diarrhea virus (BVDV), Mannheimia haemolytica, and sometimes Mycoplasma spp.

CASE HISTORY

The case started at 8 August 2017. After moving calves from the rearing unit to a fattening unit, some calves (2-3%) had signs of Bovine respiratory disease (BRD), including high body temperature (> 39, 5), coughing, less appetite and a higher breathing frequency. After administration of sodium-salicylaat en broomhexidine to all calves the problems became less. Added to this, individually treated calves responded well to their treatment. However, the coughing did not disappear. Until 21st of August the BRD could be managed with individually treatments of calves by the farmer, only the feed intake did not increase. On 21st of August, the BRD problems became worse again. More than 10% of the calves had high fever (> 40 degrees Celsius), dry coughing and abdominal breathing. The herd was treated with doxycyline HCl (5days), broomhexidine (3 days) and sodium-salicylaat (2 days). After 4 days, the situation was stabilized, but still 10% of the calves showed symptoms as described above. Thus it was necessary to extend the doxycyline HCl treatment to 7 days and also a therapy with tylosine was started for 7 days and sodium-salicylaat for 3 days. On 29th of August, the condition of the animals improved but the coughing did not disappear. Blood samples were taken from 5 animals with acute clinical symptoms. Three weeks later the same animals were sampled (results table 1). On Feb 1 2018 and Sept 6 the farm was screened with a cross-sectional blood investigation for BRD pathogens (results table 2 and table 3).

RESULTS OF THE TESTS

Table 1: paired sera taken from 5 animals with acute clinical symptoms. Blood samples were taken when the animals were 13 and 19 weeks on the farm (8).

animal ID	BHV-1 gE (ELISA IDEXX)		BRSV (ELISA) Titer (2log)		ELISA-BVDV (PRIONICS)		ELISA-MANH (Titer (2log)		ELISA-MB (Bio-X)	
	29-8-2017	12-10-2017	29-8-2017	12-10-2017	29-8-2017	12-10-2017	29-8-2017	12-10-2017	29-8-2017	12-10-2017
7652	negative	negative	<6,3	<6,3	negative	positive	11,8	13,5	not investiga	+
3035	positive	positive	<6,3	<6,3	positive	positive	11,3	11	not investiga	negative
6386	negative	negative	<6,3	<6,3	positive	positive	10,4	10,5	not investiga	+++++
8817	negative	negative	11	6,8	negative	positive	11,2	11,2	not investiga	negative
9947	negative	negative	<6,3	6,8	positive	positive	11,5	10,9	not investiga	+

Table 2: Crossectional investigation for BHV-1 , BRSV, BVDV and Mannheimia haemolytica of the 3 herds. Blood samples were taken on 1 February 2018 (8)

animal ID	BHV-1 gE (ELISA IDEXX)	BRSV (ELISA) Titer (2log)	ELISA-BVDV (PRIONICS)	ELISA-MANH (Titer (2log)	ELISA-MB (Bio-X)
age (weeks)					
1	positive	<6,3	positive	8,1	not investigated
1	negative	8,1	positive	8,4	not investigated
1	negative	<6,3	positive	10,2	not investigated
1	negative	<6,3	positive	10,5	not investigated
1	negative	<6,3	negative	7,9	not investigated
12	positive	<6,3	positive	8,9	not investigated
12	negative	<6,3	positive	11,5	not investigated
12	negative	<6,3	positive	13,4	not investigated
12	negative	<6,3	positive	9,8	not investigated
12	negative	<6,3	positive	10,3	not investigated
23	negative	<6,3	negative	10,1	not investigated
23	negative	<6,3	negative	10,9	not investigated
23	negative	<6,3	negative	9,7	not investigated
23	negative	7,3	negative	9,8	not investigated
23	negative	<6,3	negative	8,3	not investigated

Table 3: cross-sectional investigation for BHV-1, BRSV, Mannheimia haemolytica, Mycoplasma Bovis, PI3. Blood samples were taken on 6 September 2019 (8)

animal ID	BHV-1 gE (ELISA IDEXX)	BRSV (ELISA) Titer (2log)	ELISA-BVDV (PRIONICS)	ELISA-MANH (Titer (2log)	ELISA-MB (Bio-X)
age (weeks)					
8	negative	<6,3	not investigated, vaccinated	8,1	+++++
8	negative	7,5	not investigated, vaccinated	8,4	+++++
8	negative	<6,3	not investigated, vaccinated	10,2	+++
8	negative	<6,3	not investigated, vaccinated	10,5	+++++
8	negative	<6,3	not investigated, vaccinated	7,9	+++
20	positive	<6,3	not investigated, vaccinated	8,9	++++
20	negative	6,7	not investigated, vaccinated	11,5	++
20	negative	7,8	not investigated, vaccinated	13,4	+++
20	negative	<6,3	not investigated, vaccinated	9,8	NEG
20	negative	<6,3	not investigated, vaccinated	10,3	+++
29	negative	<6,3	not investigated, vaccinated	10,1	++
29	negative	<6,3	not investigated, vaccinated	10,9	+++++
29	negative	8,3	not investigated, vaccinated	9,7	++++
29	negative	<6,3	not investigated, vaccinated	9,8	+++
29	negative	9	not investigated, vaccinated	8,3	++

Blood samples taken on 6 September 2019 showed that Mycoplasma bovis was circulating on the farm.

ACTION PLAN

The outcome of the blood investigations showed us that there was BVDV circulation in the herd (blood samples taken on 29 August 2017 and 12 October 2017). The blood samples of 1 February 2018 showed also many calves with antibodies against BVDV, 12 weeks after arrival on the farm (table 2). Based on the results it was decided to start with BVD vaccination (Bovela©, Boehringer Ingelheim). The first calves were vaccinated in the rearing unit on 4 September 2018. We decided to vaccinate all calves of new rounds in the rearing unit in the first week after arrival, for a year and then evaluate the outcome of the rounds looking at the technical results (growth/day, mortality, veterinary expenses and antibiotic usage in animal daily dose).

RESULTS

The first round, which had been vaccinated against BVDV, had at the end probably an Infectious bovine rhinothracheitis (IBR) outbreak. We vaccinated these calves also against IBR. This herd was excluded from the results. The results of the BVD (Bovela© Boehringer Ingelheim) vaccinated herds (2 in total) were compared with 5 rounds before BVD vaccination (table 4).

Table 4 Technical results of 5 rounds without BVD vaccination and 2 BVD vaccinated rounds

parameters	without bovela BVD vaccination (5 rounds)	with bovela BVD vaccination(2 rounds)	difference	euro (€)	ADD
growing days (days)	224,64	223,05	-1,59		
growth/day (g/day)	1303,42	1286	-17,42		
mortality (%)	3,784	1,015	-2,769	3240	
slaughtered weight	182,24	180,4	-1,84	-1932	
veterinary costs (€)	5376,4	6816,5	1440,1		
veterinary transactions	699,76	801,5	101,74	-101	
veterinary costs ex vaccination (€)	5376,4	4888,5	-487,9	487,9	
ADD (animal daily dose)	36,648	31,765	-4,883		4,88
vaccin	0	1928	1928	-1928	

In case of mortality we estimated the costs at 400€ and slaughtered weight we estimated at 3,5 €/kilogram.
Based on the technical results a lower mortality rate was observed in the BVD vaccinated rounds with a difference of 2,77 %, estimated at a financial win of 3240€. Average slaughtered weight difference was 1,84 kg/ calf, which means 1932 € less revenues for the vaccinated rounds.

Veterinary costs were 488 € less for the BVD vaccinated rounds (without the costs of vaccination 1928€ and the labor of application of the vaccine 101€). The animal daily dose was 4,88 lower for the BVD vaccinated rounds.

DISCUSSION

BVDV infections remains a source of significant economic losses in the veal sector. The best way to eliminate BVDV is to refuse calves persistent and transient infected with BVDV. For this farm, this is not yet possible, so vaccination is a measure to prevent spreading of BVDV, clinical symptoms and limiting economic losses. In this case, we compare two vaccinated rounds against five non-vaccinated rounds. Comparing more rounds would give a better and more reliable result.

CONCLUSION

Looking at the financial results you could conclude that vaccination leads to more investments and less return, in total 233 € / round. While on the other hand reducing the antibiotic usage by 4,88 ADD. Less ADD means that fewer ill calves needed to be treated with antibiotics and less veterinary costs.
The difference in slaughter weight of 1,84 kg/calf is small (and even less after correction for number of growing days) and could have different reasons, such as different type of feed and the amount of the different types of feed or other pathogens present. Re-calculation of financial results excluding the difference in slaughter weight, results in a positive result of 1699 € / round for BVD vaccinated rounds. This is a benefit of € 5,66 for each rose veal calf, which has been vaccinated.

LITERATURE

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