

## USE OF POOLED SAMPLES FOR A COLLECTIVE BVDV-INFECTION CONTROL SCHEME IN BRITTANY (WESTERN FRANCE)

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### Introduction

In Brittany (western France), 98% of farmers are affiliated to bovine health organisations (Groupements de Défense Sanitaire - GDS -).

A control scheme against bovine viral diarrhoea virus (BVDV) infection has been implemented by the GDS since 1986; until 1996, its main aim was to detect and slaughter PI animals in herds with clinical signs (mucosal disease, runting disease, abortions ...). During this period, the herd annual incidence rate was 3 %, but many recontaminations were observed (corresponding to 10 % of the total incidence). Therefore, it was decided by farmers to implement a collective BVDV-infection control scheme, aiming at controlling the risk of new infections in all herds. In a preliminary step, specific studies were carried out to assess the prevalence and dynamics of BVDV infection in Brittany (1996 - 2000). Since 2000 all the dairy herds have been included in this new collective BVDV control scheme.

### Material and methods

Basically, the control scheme is organized in three steps.

The first step consists in the determination of the BVDV-infection status of each herd. It is based on levels of BVDV-antibodies measured in bulk tank, using a blocking P80 ELISA test. Results are expressed in percentage inhibition (found to be correlated to the within-herd prevalence of antibody-positive cows) and split in three classes (Table 1).

Percentage of inhibition	class	Prevalence of antibody positive cow (mean)
≤ 35 %	0	0 - 10 % (5 %)
35 < < 60%	1	10 % - 30 % (22 %)
≥ 60 %	2	> 30 % (66 %)

Table (1) : relationship between percentage inhibition of bulk tank milk and prevalence of antibody-positive cows(1)

The herd-status is based on results of three consecutive testings four months apart. Based on Table 1, the 27 (2<sup>3</sup>) possible combinations are gathered in 5 different statuses (Table 2).

status	definition	
<b>A</b>	presumed non infected	000, 001, 010, 100
<b>B</b>	not recently or lowly infected	011, 101, 110, 111, 121, 210, 211, 012, 112, 021
<b>C</b>	recently infected ( ?)	102, 002
<b>D</b>	heavily infected	222, 221, 212, 122, 022
<b>E</b>	undetermined	220, 120, 200, 202, 020, 201

Table (2) : Definition of the 5 herd-statuses

The second step involves only herds having a B, C, D or E status. It aims at detecting PI among dairy cows. In these herds, a bulk milk sample of the first lactating cows is tested using the blocking P80 ELISA test; in the case of a positive result, a BVD RT.PCR technique is carried out on the whole bulk tank milk. In the case of a positive PCR test, all dairy cows are serologically tested then virologically for the negative ones.

The third step involves all herds having a D status and those of B, C or E status experiencing a first lactating-cows positive test using ELISA. Five pregnant heifers and five young heifers (older than 6 months) are serologically tested using the blocking P80 ELISA test. When more than 2 heifers are found positive, the whole group comprising the positive-tested heifers is serologically tested, then seronegative animals are virologically tested. PI are slaughtered within one month following detection. This procedure is implemented six and twelve months later when young calves are older than 6 months. Investigations are stopped when three consecutive heifers groups are seronegative.

### Results

Herds statuses

	Feb. 2001	Feb. 2004
<b>A</b>	40 %	42 %
<b>B</b>	20 %	22 %
<b>C</b>	1 %	1 %
<b>D</b>	37 %	33 %
<b>E</b>	2 %	2 %

Table (3) : distribution of herds according BVDV-infection statuses in february 2001 and february 2004

The proportions of herds in the different statuses were almost steady from February 2001 to February 2004 (Table 3).

Complementary investigations

Status	First lactation bulk milk	PCR result in bulk tank milk
<b>B and E</b>	+ 38 %	+ 1 %
	- 62 %	- 99 %
<b>C</b>	+ 50 %	+ 0 %
	- 50 %	- Not concerned
<b>D</b>	+ 65 %	+ 10 %
	- 30 %	- Not concerned

Table (4) : results of RT PCR applied to bulk milk tank according herd-status and bulk milk of first lactating cows

Among B and D statuses, respectively 23 and 38 % of pregnant heifers groups have at least one antibody positive heifer. In total, less than 10 % of the herds hold at least one PI animal ; this proportion is higher in D + herds status (D with a seropositive test on first lactation cows) than in the other cases, as shown in table (5).

Status	Status with first lactation cows	Percentage of herds with at least a PI animal	
		Within status	On whole herds
A	-	-	0 %
B & E	B ⊕ E ⊕	17 %	1 %
	B - E -	0.5 %	0,1 %
C	C ⊕	50 %	0,5 %
	C -	5 %	0,05 %
D	D ⊕	30 %	7 %
	D -	2 %	0,15 %
TOTAL			10 %

Table (5) : Proportion of herds with PI animals

#### Discussion

A BVDV control scheme may be very costly. Investigations based on (i) individual serological tests and (ii) virological tests in antibody-negative animals cost about 10 € for each animal.

Farmers wish efficient and not expensive control schemes. Our method, based on use of pool samples in successive linked steps (focussing on target animals, e.g. primiparous and heifers) is much cheaper : about 1,5 € per animal. The method allows to give priorities and to adjust the means, especially the human ones.

An action only in D + herds (20 % of the herds) should allow to detect at least 70 % of herds with PI animals.

Relevant indicators are necessary to assess the efficiency of our scheme. Analysis of transition probabilities between statuses from February 2001 to February 2004 shows that the survival rate in A status for a herd located in an area (geographical department) applying the collective scheme is higher (83%) than for A-status herds in other areas (69%).

#### Conclusion

BVDV control scheme needs new tools and methods : screening tools, sampling, risk assessment are necessary for an economic approach of animal health management. These methods must be associated with patience and risk acceptance. Brucellosis and tuberculosis control required more than 20 years !

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