Efficacy and Long-Lasting Activity of Spiramycin in Young Beef Cattle with Infectious Enzootic Broncho-Pneumonia (I.E.B.P.)

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Summary

Multicentric clinical trials performed in young beef cattle with I.E.B.P. demonstrated the excellent efficacy of spiramycin at an optimal dose of 100,000 IU/kg. The recommended frequency of administration in curative treatment is 2 injections at a 48 hour interval and the clinical recovery rate is 80–90%. A single injection of 100,000 IU/kg confers very high protection in metaphylactic treatment.[8] The activity of spiramycin against *mycoplasma* and *Pasteurella*, the principal germs involved in I.E.B.P., may be explained by the excellent diffusion and concentration of this antibiotic in the lung tissue and bronchial secretions.

Introduction

Infectious Enzootic Broncho-Pneumonia (I.E.B.P.) remains a cause for concern in intensive production systems. Treatment of these infectious pneumopathies is usually based on control of the infections or superinfections caused by *mycoplasma* (*M. bovis*) and/or bacteria (*Pasteurella haemolytica*, *Pasteurella multocida*).[4]

Our work was carried out to confirm the efficacy of injectable spiramycin* on young beef cattle in fattening units at the onset of an outbreak of I.E.B.P.

Materials and Methods

Production Units and Animals

Three large production units in Brittany and Champagne, consisting of about one hundred young beef cattle, were studied. The animals, which weighed 280 to 300 kg, were grouped in pens of 8 to 10 and were checked for homogeneity and absence of antibiotherapy during the 10 days preceding their arrival at the unit.

Treatments and Clinical Survey

Clinical parameters scored: On arrival and up to the end of the observation period 21 days after the disappearance of symptoms, each animal was subjected to a daily standard clinical examination[1] at a fixed hour. The following 6 symptoms were examined:

Respiratory symptoms:
- respiration rate
- nasal discharge
- cough

Systematic symptoms:
- rectal temperature
- anorexia
- general behavior

These data were weighted and bulked to give a mean comprehensive score (MCS). The MCS was 1.0 to 1.2 for the normal state and 1.2 to 1.9 for moderately severe cases and equal to or greater than 2.0 in severe cases of the disease.

Treatments:

Curative treatment: If the MCS was ≥ 1.8 (total or partial anorexia, rectal temperature of about 40°C, pronounced respiratory symptoms), the following curative treatment was initiated:

Spiramycin: 100,000 IU/kg B.W.—2 injections at a 48 hour interval.
Oxytetracyclin**: 20 mg/kg B.W.—1 injection.

Recovery was indicated by return to an MCS of 1.2 that

* *Svanovil 20® Rhone-Neruieux, France*

** *Terramycine® Longue action - Pfizer France, dosage recommended by the manufacturer.*

remained stable for several days.

Metaphylactic treatment: If more than 30% of the animals were sick and undergoing treatment, a protective treatment with the same antibiotic was given to the other animals in the pen.[8]

Spiramycin: 100,000 IU/kg B.W.
—1 injection, or

Oxytetracyclin*: 20 mg/kg B.W.
—1 injection.

Interpretation of the clinical results: Clinical evaluation was based on the recovery rate (success/failure as a percentage), on evolution of the MCS after the first injection and on the percentage of animals protected by the metaphylactic treatment (observed for 15 days posttreatment).

Microbiological Tests

Samples were taken by transtracheal aspiration from 47% of the sick animals (57/121), prior to treatment, for identification and counting of *Pasteurella* and *Mycoplasma bovis*.

Serological tests were carried out on the same sick animals, (one of two serum samples being taken on the day of treatment, the other 3 weeks later), to detect the possible participation of the major respiratory diseases viruses: IBR, RSV, PI_3 and BVD.

Microbiological Results

Various aetiological agents were identified.

Site 1

(96 steers), 20 of the 31 sick animals were sampled by transtracheal aspiration (TTA) prior to treatment. Bacteriological tests revealed the presence of *P. haemolytica* and/or *P. multocida*, as well as *M. bovis*. No significant seroconversion was observed for IBR, BVD, PI_3 or RSV viruses.

Site 2

(107 steers), 19 of the 50 sick animals were sampled by TTA before treatment and the presence of *P. haemolytica* and/or *P. multocida*, and *M. bovis* was demonstrated. A clear seroconversion of BVD and PI_3 viruses was detected.

Site 3

(66 steers), 18 of the 41 sick animals were sampled by TTA before treatment. *P. multocida* and/or *P. haemolytica* were isolated. *Mycoplasma bovis* was not detected. Passage of RSV virus was clearly demonstrated.

TABLE 1. Bulked results of bacteriological tests before and after treatment for the three production units.

	Spiramycin 100,000 IU/kg B.W. 2 injections—48 h		Oxytetracyclin 20 mg/kg B.W. 1 injection		Percentage Variation	
	Before Treatment	After Treatment (8 days)	Before Treatment	After Treatment (8 days)	Spiramycin	Oxytetracyclin
Number of Carriers of:						
Mycoplasma bovis ($\geq 10^2$ col/ml)	4/29	5/29	6/28	13/28	+3% (1/29)	+25% (7/28)
Pasteurella multocida or *haemolytica* (presence)	21/29	5/29	23/28	10/28	55% (–16/29)	–46% (–13/28)

TABLE 2. Evaluations of clinical results after curative and metaphylactic treatment of young beef cattle with spiramycin (Suanovil 20®) or Oxytetracyclin.

	Spiramycin (IM) 100,000 IU/kg			Oxytetracyclin (IM) 20 mg/kg		
Curative Treatment	Two injections at 48 h intervals			One injection		
	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
No. of young beef cattle treated	20	24	20	11	26	21
Mean MCS on Do	1.85	2.08	1.98	1.81	1.98	2.01
Mean MCS on Do+1	1.51	1.32	1.20	1.72	1.23	1.27
Cured animals	15/20 (75%)	20/24 (84%)	17/20 (85%)	7/11 (63%)	13/26 (50%)	14/21 (67%)
Metaphylaxis	Single injection			Single injection		
	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
Protected animals	15/26 (58%)	21/23 (91%)	10/10 (100%)	11/39 (28%)	31/34 (91%)	11/15 (73%)

Discussion

TABLE 3. Comparison of the concentrations of spiramycin obtained in the serum and bronchial secretions after two intramuscular injections of 100,000 IU/kg B.W. at a 48 hour interval.

t	5 h	29 h	53 h	77 h
Serum (IU/kg)	13.5±5.7	2.0±0.6	12.8±3.9	2.2±0.5
Bronchial secretions (IU/ml)	26.5±15.2	42.2±27.2	71.3±26.9	54.1±17.9
Secretion serum	2	21	6	25

These concentrations in the bronchial secretions[2] should be compared with the MIC values for *P. haemolytica*, *P. multocida* and *M. bovis*. The extreme values are given in Table 4.

TABLE 4. Extreme MIC values for Spiramycin against *Pasteurella* and *Mycoplasma bovis*.[5,7]

	*Mycoplasma bovis**	*Pasteurella** haemolytica*	*Pasterurella** multocida*
Extreme MIC Values	1.6 IU/ml and 51.2 IU/ml	6.4 IU/ml and 51.2 IU/ml	3.2 IU/ml and 51.2 IU/ml

* Dilution in liquid medium

** Diffusion in solid medium

Comparison of Tables 3 and 4 shows that the MIC values for the three germs under consideration are largely attained by Spiramycin in the bronchial secretions. All these data indicate that present antibiogram interpretations strongly penalize Spiramycin. The susceptibility or resistance values currently defined by the disk method are based on MIC's well within the concentrations detected in the lungs. From a practical viewpoint the rules of interpretation require revision.

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Abnormal Morphology of Bovine Spermatozoa

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Abnormal Morphology of Bovine Spermatozoa deals with the classification and interpretation of bovine sperm defects. Just published by the Iowa State University Press, the book brings together information on abnormal sperm morphology widely dispersed in literature and includes the authors' findings in research and clinical experiences. It reviews the essential features known about the differentiation of male germ cells into mature spermatozoa and categorizes defects of bovine spermatozoa based on their morphology, pathology, and etiology. The book also presents data on the significance of the defects to fertilizing capacity of the species. It proposes future research directions needed in evaluation and diagnosis in male infertility.

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