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Comparison of Efficacy of Tulathromycin (Draxxin®) and Tildipirosin (Zuprevo®) in the Treatment of *Mycoplasma hyopneumoniae* Infection in Pigs

Authors: RG Nutsch, MB Wachowski, LP Taylor, H Moyaert, N Wuyts
(Pfizer Animal Health, Madison NJ, USA)

The objective of this study was to compare the efficacy of Draxxin® Injectable Solution (Pfizer Animal Health) and Zuprevo® Solution for Injection (MSD Animal Health) in the treatment of disease in a *Mycoplasma hyopneumoniae* (*M. hyo*) experimental infection challenge model. Zuprevo is not approved for the treatment of *M. hyo.* This study addresses scientific research under well controlled laboratory conditions. Veterinary Resources Inc, Ames IA enrolled seven week old pigs that were serologically negative for *M. hyo*. On two consecutive days, study candidates were administered 10 ml of lung homogenate each day containing *M. hyo* isolate ISU LI-39. Day 0 enrollment requirements were met 7 days after the first day of inoculation when 4 of 5 experimentally infected animals euthanized on a single day had gross pneumonic lung lesions calculated at greater than 5%. Once Day 0 was established all saline-, Zuprevo- and Draxxin-treated pigs were placed in their allotted pens per the randomization provided by Pfizer VMRD Biometrics group. Four animals were placed into a pen with all of the animals within a pen receiving the same treatment such that the pen was the experimental unit. Space was maintained between pens to reduce direct exposure of respiratory pathogens between pens. Masking to treatment was maintained for the veterinarian responsible for clinical observations and lung lesion assessments. Animals were evaluated periodically for cough, respiration and attitude. Nasal swabs were collected prior to inoculation, on Day 7 and prior to euthanasia. On Day 28, all animals were euthanized in accordance with the AVMA Guidelines on Euthanasia 2007. A post-mortem examination which included examination of the lungs was conducted by a veterinarian. The percentage of pneumonic lung lesions for each lung lobe was inserted in a weighted formula for calculation of the total percent lung with lesions. Nasal swabs and BAL samples were submitted for *M. hyo* quantitative PCR assay at Iowa State University Veterinary Diagnostic Laboratory, Ames Iowa. This study protocol was reviewed by and was conducted in compliance with the Investigator's Animal Care and Use Committee.

Lung Lesion Scores: The mean percentage of lung with lesions for the Zuprevo-treated (10.02 ± 1.5) and the Draxxin-treated (5.24 ± 1.1) groups were significantly less ($P = 0.0374$ and $P = 0.0003$ respectively) than for the saline group (15.53 ±1.8). The mean percent of lung with lesions per animal in the Draxxin-treated group was significantly less ($P = 0.024$) than in the Zuprevo-treated group.

Summary of Percentage of Total Lung with Lesions – Back Transformed Least Squares Means, Standard Errors and Ranges

Treat-ment #	# of Ani-mals	Back Transform LS mean % Lung with Lesions	Lower 95% Confidence Limit of Mean	Upper 95% Confidence Limit of Mean	Range % Lung with Lesions
Saline	32	15.53	11.78	19.70	0.75 to 34.25
Zuprevo	32	10.02	6.98	13.54	0.20 to 37.00
Draxxin	32	5.24	3.07	7.94	0.00 to 27.00

Summary of Percentage of Total Lung with Lesions – Significance Values for A Priori Contrasts among Least Squares Means

Contrast	*P*-value	Significance at .05 Level
Saline vs Zuprevo	0.0374	Yes
Saline vs Draxxin	0.0003	Yes
Zuprevo vs Draxxin	0.024	Yes

MICs for isolate ISU LI-39: – tulathromycin = < 0.015 - tildipirosin = 2

Nasal swab quantitative *M. hyo* PCR: On Day 7, the mean percentage of copies per reaction of the PCR for the Draxxin-treated (0.20 ± 0.01) group was significantly less ($P = 0.0231$) than for the saline group (2.58 ± 0.43). The Zuprevo-treated group was not significantly different from the saline-treated group on Day 7 but was significantly different on Day 28.

BAL Quantitative *M. hyo* PCR and Clinical Signs: On Day 28 the geometric least squares means of copies per reaction of the quantitative *M. hyo* PCR for the Zuprevo- and the Draxxin-treated group was not significantly different from the saline-treated group. Clinical signs were mild therefore no significant reduction was detected.

Based on the results of this study we conclude that Draxxin is significantly more effective ($P = 0.024$) than Zuprevo at reducing pneumonic lung lesions in the treatment of acute *Mycoplasma hyopneumoniae* associated disease.