## **Table of Contents**

I. Introduction	1
II. Literature Review	3
1. Physiology	3
1.1 Anatomy and functions of the airways	
1.2 Hypoxaemia	
1.2.1 Causes of Hypoxaemia	
1.2.2 Causes of Hypoxaemia during bronchoscopy	
1.3 Assessing and Monitoring Oxygenation	
1.3.1 Arterial blood gas analysis	
1.3.2 Partial Pressure of Oxygen	
1.3.3 Alveolar-Arterial Oxygen Difference (AaDO₂)	
1.3.4 Ratio of partial pressure of arterial oxygen/fraction of inspired oxygen (PaO <sub>2</sub> /FiO <sub>2</sub> )	
2. Oxygen Supplementation	
2.1 Indications for oxygen therapy	
2.2 Complications associated with oxygen therapy	20
2.2.1 Hyperoxic acute lung injury (HALI)	20
2.2.2 Absorption Atelectasis	21
2.2.3 Effects of inhaling dry and cold air	22
2.3 Traditional oxygen therapy (TOT) in veterinary medicine	22
2.3.1 Non-invasive methods	23
2.3.2 Invasive methods	
2.4 Oxygen Therapy during Bronchoscopy in veterinary medicine	27
3. High Flow Oxygen Therapy	
3.1. Technical Details	
3.1.1 HFOT Device	
3.1.2 Interface	
3.1.3 Settings	
3.2 Mechanisms of action	
3.3 Risks and Adverse effects	
3.4 Indications	
3.5 HFOT during bronchoscopy	
3.6 High Flow in Veterinary Medicine	
III. Study objectives	43
IV. Material and Methods	44
1. Study design	44
2. Subjects	44
3. Study groups	44
3.1 High Flow Oxygen Therapy (HFOT) Group	
3.2 Traditional Oxygen Therapy (TOT) Group	
4. Study Procedure	46
4.1. Premedication and Preoxygenation	46
4.2 Anaesthesia induction	
4.3. Fibreoptic bronchoscopy and bronchoalyeolar layage (BAL)	



4.4. Recovery	48
5. Data collection	48
5.1. Baseline characteristics	
5.2. Vital signs during anaesthesia	48
5.3. Tracheal Gas Measurement	48
5.4. Pulse Oximetry (SpO <sub>2</sub> )	
5.5 Arterial Blood Gas Analyses	
5.6 Oxygen Indices	
5.6.1. Alveolar-arterial oxygen difference (AaDO <sub>2</sub> )	
5.6.2 Ratio of partial pressure of arterial oxygen/fraction of inspired oxygen (PaO <sub>2</sub> /FiO <sub>2</sub> )	
5.7 Complications and Adverse Effects of Oxygen Therapy	
6. Statistical analysis	52
V. Results	53
1. Subjects	53
1.1 Patient characteristics in the traditional oxygen therapy group (TOT)	53
1.2 High Flow Oxygen Therapy (HFOT) group	54
2. Baseline parameters	54
3. Outcome of arterial partial pressure of oxygen (P <sub>a</sub> O <sub>2</sub> ) at specified time points	57
3.1 P <sub>a</sub> O <sub>2</sub> after preoxygenation (t1)	57
3.2 P <sub>a</sub> O <sub>2</sub> after induction of anaesthesia (t2)	
3.3 P <sub>a</sub> O <sub>2</sub> before BAL sampling (t3)	
3.4 P <sub>a</sub> O <sub>2</sub> after BAL sampling (t4)	
3.5 P <sub>a</sub> O <sub>2</sub> at the end of the procedure (t5)	61
3.6 P <sub>a</sub> O <sub>2</sub> one hour post procedure (t6)	62
3.7 Comparison of PaO2 at all specified time points	63
4. Tracheal FiO₂ and oxygen indices	67
4.1 Tracheal fraction of inspired oxygen (FiO <sub>2</sub> ) before and after BAL (t3 and t4)	67
4.2 PaO <sub>2</sub> /FiO <sub>2</sub> at baseline, t3 and t4	
4.3 AaDO <sub>2</sub> at baseline (t0) and one hour after the procedure (t6)	
5. Partial pressure of carbon dioxide (P <sub>3</sub> CO <sub>2</sub> ) at all time points	68
6. Duration of bronchoscopy and recovery time	68
7. Complications and adverse events	69
VI. Discussion	71
1. Subjects and baseline parameters	72
2. Oxygen therapy methods	73
3. Oxygenation during bronchoscopy	74
3.1 Preoxygenation and Induction	
3.2 Before bronchoalveolar lavage (BAL)	
3.3 After bronchoalveolar lavage (BAL)	
3.4 At the End of the Procedure	
3.5 One hour post procedure	
3.6 Overall outcome	80
4. Complications and adverse events	
5. Limitations of the study	84
VIII Complexion	00

VIII Summary	87
IX. Bibliography	91