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**Effect of Age on the
Pharmacokinetics of Meloxicam in
ISA Brown Chickens (*Gallus gallus
domesticus*).**

*A thesis presented in partial fulfilment of
the requirements for the degree of*

**Master of Science
in
Physiology**

at Massey University, Palmerston North,
New Zealand.

**Megan Gildersleve
2015**

Effect of Age on the Pharmacokinetics of Meloxicam in ISA Brown Chickens (*Gallus gallus domesticus*).

Megan Gildersleve

Abstract

The Non-Steroidal Anti-Inflammatory drug (NSAID) meloxicam has been deemed a safe and effective treatment for numerous inflammatory conditions and injuries from extensive pharmacokinetic and pharmacodynamic studies in various mammalian species. However, there is a lack of meloxicam pharmacokinetic information in avian species. This leads to pharmacokinetic data being extrapolated from mammals in order to administer and treat birds. This often leads to ineffective pain relief or overdoses that can be fatal for birds. Due to this void in literature this study was designed to increase the basic pharmacokinetic knowledge in birds but to also determine if age affects the pharmacokinetics of meloxicam in ISA Brown chickens. Meloxicam was injected intravenously (IV) at 2 mg/kg in 20 healthy ISA Brown chickens (*Gallus gallus domesticus*). One group consisted of 10 ISA brown chickens that were 18 weeks old, the second group consisted of 10 ISA Brown chickens that were 24 months old. Serial blood samples were withdrawn from a catheterised vein from each ISA Brown chicken into a heparinised vial at 0, 10, 20, 30 minutes, 1, 4, 8, 10, 12 hours after the administration of meloxicam.

The pharmacokinetics for ISA Brown chickens were calculated using the non-compartmental model, which was analysed using the mean data from each group of ISA Brown

chickens. The elimination half-life, steady state volume of distribution and mean resident time were significantly higher in the 24 month old ISB Brown chickens compared to the 18 week old ISA Brown chickens. Overall, the results indicate that as an ISA Brown chicken ages the pharmacokinetics of meloxicam show some significant changes in crucial pharmacokinetic parameters. The differences in the pharmacokinetic parameters may ultimately affect the efficacy of meloxicam when treating 'geriatric' birds due to possible age-related health issues in the liver and kidneys, which are major organs involved in processing drugs.

KEYWORDS: Meloxicam, non-steroidal anti-inflammatory drugs, ISA Brown chickens, analgesia, pharmacokinetics.

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Acknowledgements

Thank you to my supervisor Dr Preet Singh and the technical staff Ty and Antony, who helped me through my master's project. I want to extend my appreciation to Don, Ed and Collin at the Feed Processing Unit at Massey University, for allowing me to conduct my study at your facilities. A huge thank you to Bradley Horton from The Mathworks, you were an invaluable source of knowledge and encouragement when learning and using Matlab and the Simbiology application.

To my wonderful post graduate friends Brittany, Anna and Geneva. It was your constant support and encouragement that helped me get through this project. Knowing I had you to there to laugh and cry with as we went through similar challenges slowed the insanity from setting in.

To the IVABS administration staff, thank you for helping me with all the academic and administrative matters.

I would like to acknowledge the Massey University Scholarship Committee, Avian research funds, and the Graduate Women Manawatu Charitable Trust for the financial assistance you provided me in order to complete my project.

Finally, the biggest support I have had throughout my time at university is my family. Your prayers, unconditional love and support that you have shown me has been indescribable and treasured.

List of abbreviations

- AIC** – Alkaline Information Criterion
- AA** - Arachidonic acid
- AUC** – Area under the curve
- AUMC** – Area under the moment curve
- BIC** – Bayesian Information Criterion
- BMR** – Basal Metabolic Rate
- C_{lb}** – Body (systemic) clearance
- CNS** – Central nervous system
- C_{p0}** – Concentration at time zero
- COX-1** – Cyclooxygenase 1
- COX-2** - Cyclooxygenase 2
- CYP** - Cytochrome P450
- t_{1/2α}** – Distribution half-life
- α** – Distribution rate constant
- DAD** – Diode array detector
- ED** – Electrochemical detector
- t_{1/2β}** – Elimination half-life
- β** – Elimination rate constant
- GI** – Gastrointestinal
- GFR** - Glomerular filtration rate
- t_{1/2}** – Half-life
- HPLC** – High Performance Liquid Chromatography
- IM** – Intramuscular
- IT** – Intrathecal
- IV** – Intravenous
- LC/MS** – Liquid chromatography/Mass spectrophotometer
- LOD** – Limit of detection
- LLE** – Liquid-liquid extraction
- LLD** – Lower limit of detection
- LLQ** – Lower limit of quantification

MAT - Mean absorption time

MEC – Mean effective concentration

MRT – Mean residence time

C_{max} - Maximum concentration

NSAIDs – Non Steroidal Anti-inflammatory drugs

OA – Oral administration

C_p – Plasma drug concentration at any time

SPE – Solid phase extraction

SC – Subcutaneous

TXA₂ and TXB₂ – Thromboxane

C_L - Total clearance

V_{dt}– Total volume of distribution

V_d – Volume of distribution

V_{dc} – Volume of distribution, central compartment

V_{dp} – Volume of distribution, peripheral compartment

V_{ss} – Volume of distribution, steady state

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To my parents

Andrew and Fiona Gildersleve

I cannot truly express how much your unconditional love and support has meant to me. Throughout this journey you have reminded me of the Lord's love and grace. And that I can do all things through Him who strengthens me.

To my papa

Late David Henry Pledge

Even though you were not here to see me accomplish this goal. Your passion for science lives on through me, and I hope I have done you proud.

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