

Can acute phase proteins be used prognostically?

Lameness (preliminary results)

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Agenda

- Background and aim
- Material and methods
- Preliminary descriptive results
- Next steps



Background – PhD project

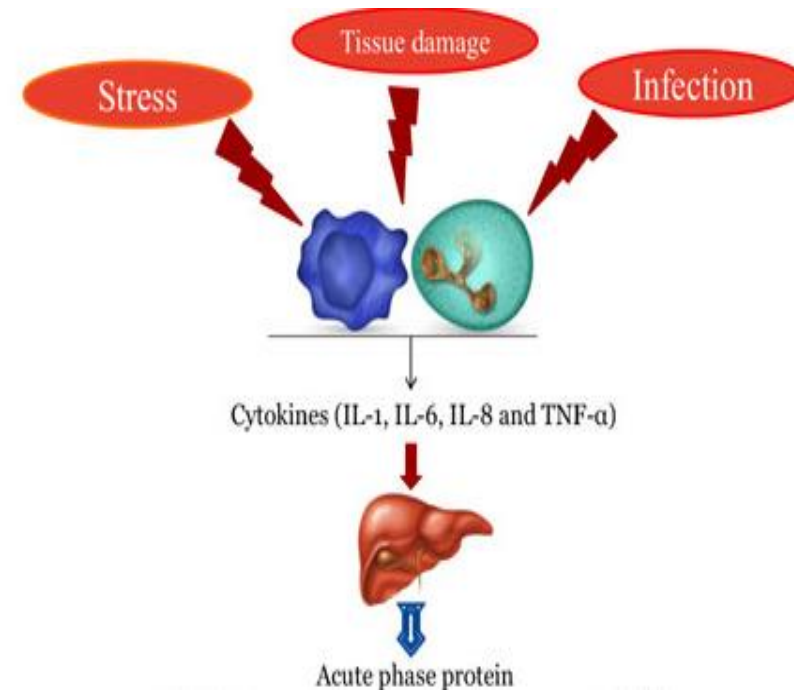
Reduce antibiotic use through pre-treatment diagnostics

- Lameness in gestating sows
- Tools to differentiate infectious from non-infectious causes of lameness



Background

- Acute phase proteins
 - Part of the acute phase response
 - Unspecific markers
 - Studies from human medicin show that APPs can be used to guide AB treatment, evaluate treatment effect, etc.
 - APPs are disease and species specific
 - Pigs: CRP, SAA, HP og Pig-MAP



CRP

SAA

Haptoglobin

Pig-MAP



Why prognostic value of APPs?

Previous study on APPs and lameness

- Differences in CRP and Pig-MAP between healthy and lame sows
- No differences between sows with and sows without inflammation
- Validated POCTs did not perform satisfactorily
- Decided not to move forward with the POCTs, currently.

AND

- Did not have a good threshold to continue with

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C-reactive protein and pig major acute phase protein levels are elevated in lame gestating SOWS

Provisionally accepted



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- Study on UTIs in cows found high prognostic accuracy of SAA and HP (El-Deeb et al., 2016)
- High HP or SAA level -> poor treatment response after antibiotic treatment (El-Deeb et al., 2016)
- Another study found that HP could predict *S. aureus* subclinical mastitis cases that would self-resolve (lower HP). (Tabatabaee et al., 2021)

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Acta Veterinaria Scandinavica

REVIEW

Open Access



Diagnostic utility of acute phase proteins and their ability to guide antibiotic usage in pigs, horses, and cattle: a mapping review

Nadia Jakobsen^{1*} , Nicolai Rosager Weber², Inge Larsen¹ and Ken Steen Pedersen^{1,3}

Abstract

To mitigate the use of antibiotics for many of the multifactorial diseases seen in pigs, horses and cattle, new diagnostic tools are needed. Acute phase protein (APP) measurements can, in humans, be used to guide antibiotic treatment initiation, evaluate treatment efficacy, and make a prognosis. The aim of this review is to collect evidence on the clinical functionality of APP measurements as a tool to guide antibiotic treatment in pigs, horses, and cattle. Literature was retrieved using Medline, CAB Abstracts and Google Scholar. The acute phase response has been investigated for a plethora of diseases and clinical signs and the major acute phase proteins are elevated in diseased compared to healthy animals. Few studies correlated acute phase response with aetiology, antibiotic treatment efficacy, prognosis, or severity of disease. The existing research does not support that APP can be used to guide antibiotic treatment, but the reported studies indicate that C-reactive protein (CRP) might be able to differentiate between bacterial and non-bacterial causes of disease in pigs. Serum amyloid A (SAA) might reflect underlying aetiology in horses and infectious or non-infectious cases of mastitis in cows.

Keywords Antimicrobial use, Diagnostics, Infectious disease, Veterinary medicine

Aim and objectives

Aim: to **establish the prognostic value of CRP and Pig-MAP levels** and **recovery time after treatment** with antibiotics, NSAIDs and relief in a sick pen for a maximum of 28 days.

Objectives:

1. To compare CRP and Pig-MAP levels in lame sows that recover and lame sows that do not recover after treatment.
2. Establish how many sows recover from the lameness and how many must be euthanized or are still requiring some kind of relief/treatment after 28 days.

Materials and methods



3 HERDS > 1000
SOWS



116 SOWS
INCLUDED



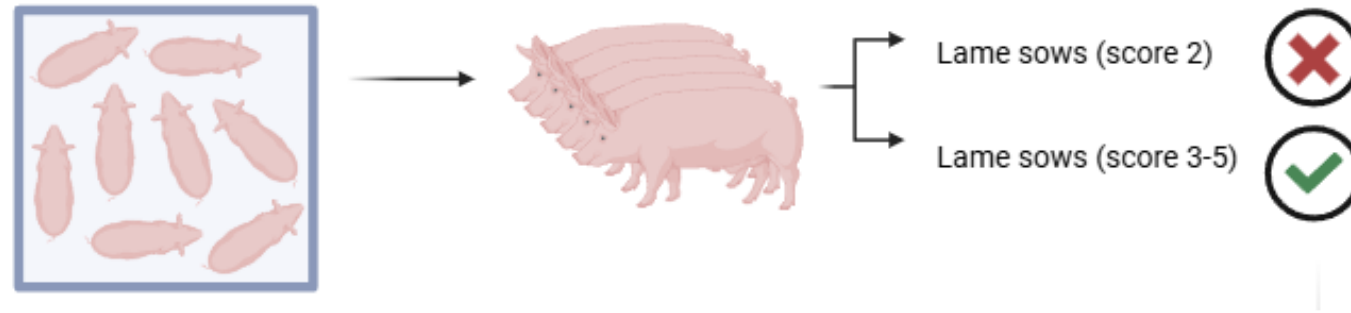
MAY UNTIL
SEPTEMBER 2024



VISIT EVERY 7TH
DAY

- Sows with treatment requiring lameness
 - Moderately to severely lame (score 3-5)
- Weekly clinical evaluation
- Paired bloodsamples
 - Inclusion and at exit from the study-> day 28 or at euthanasia/recovery
- Treatment (max. 28 days)
 - Ethacillin vet. 15 mg/kg (5x4 days)
 - Melovem 20 mg/ml (5x4 days)
 - Sick pen

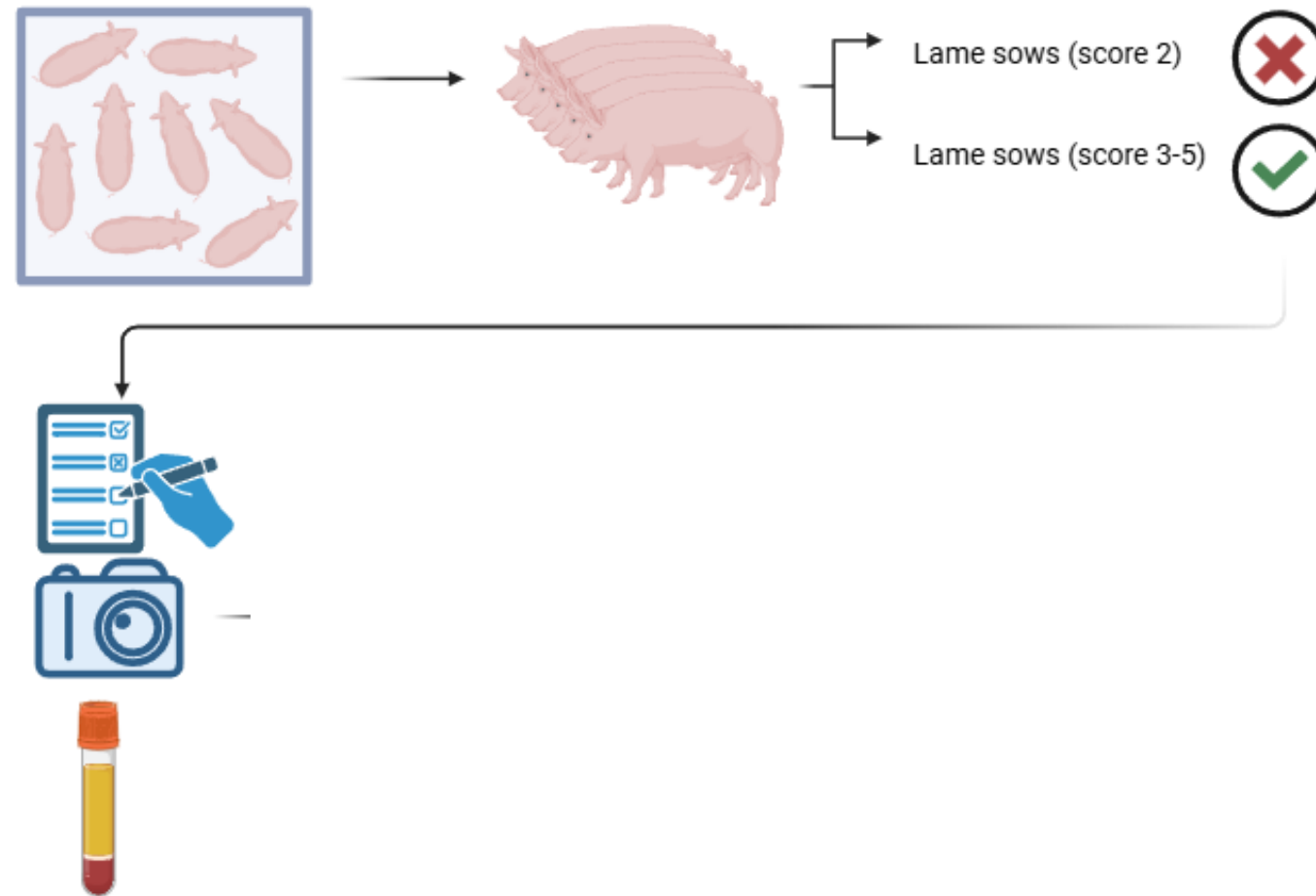
Material and methods



Lameness score

Lameness score		
Score	Category	Description
1	None/Minimal	No lameness/ Stiff, ataxic or swaying gait, shortened stride
2	Slight	Limp visible, but animal unconcerned and exercises normally
3	Moderate	Obvious limp present all the time (with head bobbing), animal having some difficulty with exercise, moderate kyphotic posture
4	Severe	Animal barely weight bearing, severely lame but able to move, pronounced kyphotic posture
5	Critical	Animal not weight bearing, severely lame, severely affected mobility, severe kyphotic posture

Material and methods



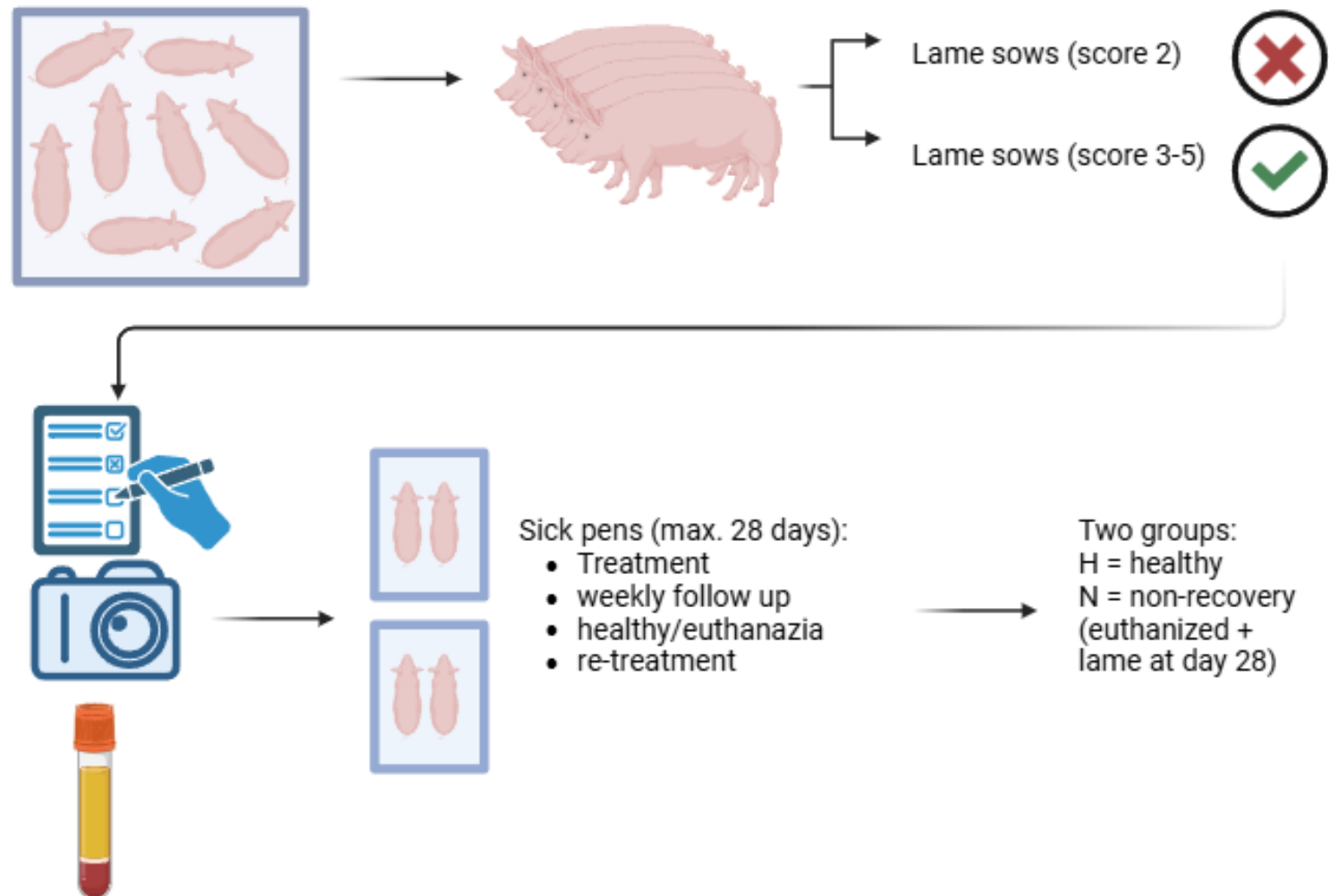
Clinical evaluation

Clinical exam – general	
General information	Date: _____ Initials: _____ CHR: _____ Herd – ID: _____
Sow - Information	Sow-ID: _____ Parity: 1 <input type="checkbox"/> 2-3 <input type="checkbox"/> 4+ <input type="checkbox"/> Expected farrowing date: _____ Gestation week: _____ Treated with AB in gestation unit: _____
Behaviour	Does the sow show normal interest in the surroundings? Yes <input type="checkbox"/> No <input type="checkbox"/> Does the sow show normal orientation skills? Yes <input type="checkbox"/> No <input type="checkbox"/> Does the sow show normal activity level? Yes <input type="checkbox"/> No <input type="checkbox"/>
Posture and movement	Normal head position? Yes <input type="checkbox"/> No <input type="checkbox"/> Can the sow stand? Yes <input type="checkbox"/> No <input type="checkbox"/> Equal weight on all 4 legs when standing still? Yes <input type="checkbox"/> No <input type="checkbox"/> Is the sow lame? Yes <input type="checkbox"/> No <input type="checkbox"/> Does the sow have claws without injuries and inflammation? Yes <input type="checkbox"/> No <input type="checkbox"/> Are the hind legs and front legs equal in presentation? Yes <input type="checkbox"/> No <input type="checkbox"/>
Body condition	Does the sow have a normal body condition? Yes <input type="checkbox"/> No <input type="checkbox"/> * * If no Skinny? <input type="checkbox"/> Fat? <input type="checkbox"/>
Well-being	Temperature: _____ (> 39.5° fever) Does the sow have a normal skin <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Does the sow have normal respiration? yes <input type="checkbox"/> No <input type="checkbox"/> (e.g. shallow, forced, fast)

	Coughing? Yes <input type="checkbox"/> No <input type="checkbox"/>
	Sneezing? Yes <input type="checkbox"/> No <input type="checkbox"/>
	Discharge from nostrils? Yes <input type="checkbox"/> No <input type="checkbox"/>
	Is the vulva normal in colour? Yes <input type="checkbox"/> No <input type="checkbox"/>
GI- tract	Signs of diarrhea? Yes <input type="checkbox"/> No <input type="checkbox"/> Rectal prolapse? Yes <input type="checkbox"/> No <input type="checkbox"/>
Reproductive organs and udder	Vulva bites? Yes <input type="checkbox"/> No <input type="checkbox"/> Discharge? Yes <input type="checkbox"/> No <input type="checkbox"/> Vaginitis? Yes <input type="checkbox"/> No <input type="checkbox"/>
Skin	Inflamed wounds/ulcers? Yes <input type="checkbox"/> * No <input type="checkbox"/> *If yes More than 1? Yes <input type="checkbox"/> No <input type="checkbox"/> Bleeding? Yes <input type="checkbox"/> No <input type="checkbox"/> > 2 cm? Yes <input type="checkbox"/> No <input type="checkbox"/> Inflamed swellings on body? Yes <input type="checkbox"/> * No <input type="checkbox"/> *If yes More than 1? Yes <input type="checkbox"/> No <input type="checkbox"/> Rupture/leaking? Yes <input type="checkbox"/> No <input type="checkbox"/> > 2 cm? Yes <input type="checkbox"/> No <input type="checkbox"/>

Clinical exam – musculoskeletal system																															
Sow - Information	Sow-ID: _____																														
Standing position and lameness	How many legs is affected by lameness? fill out table for lameness scoring																														
	<table border="1"> <thead> <tr> <th>Score</th> <th>RF</th> <th>LF</th> <th>RH</th> <th>LH</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Score	RF	LF	RH	LH	1					2					3					4					5				
Score	RF	LF	RH	LH																											
1																															
2																															
3																															
4																															
5																															
Inflammation	Signs of inflammation on affected leg(s)? Yes <input type="checkbox"/> * No <input type="checkbox"/> *If yes fill out table and circle area on illustration on next page																														
	<table border="1"> <thead> <tr> <th></th> <th>RF</th> <th>LF</th> <th>RH</th> <th>LH</th> </tr> </thead> <tbody> <tr><td>Swelling</td><td></td><td></td><td></td><td></td></tr> <tr><td>Redness</td><td></td><td></td><td></td><td></td></tr> <tr><td>Wounds</td><td></td><td></td><td></td><td></td></tr> <tr><td>Warmth</td><td></td><td></td><td></td><td></td></tr> <tr><td>Pain</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>		RF	LF	RH	LH	Swelling					Redness					Wounds					Warmth					Pain				
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Swelling																															
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Warmth																															
Pain																															
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Material and methods



Next steps

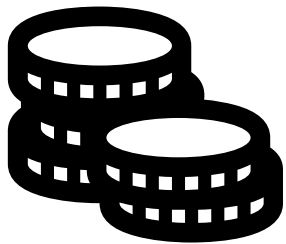
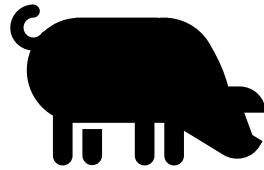
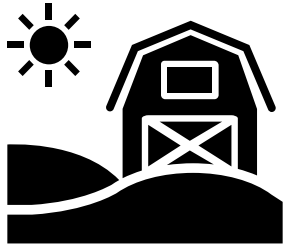
Look at CRP and Pig-Map levels and their correlation to

- Prognosis
- Recovery time
- Lameness score
- Signs of inflammation
- Parity

Look more into clinical evaluations

Thermography

Acknowledgements



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Thank you for your attention!

