The role of PCV2 in PRDC

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PCV2 associated and possibly associated syndromes or diseases (PCVAD)

- PMWS
- PDNS
- PRDC
- PNP
- reproductive failure
- granulomatous enteritis
- necrotizing lymphadenitis
- exudativa epidermitis
- congenital tremor

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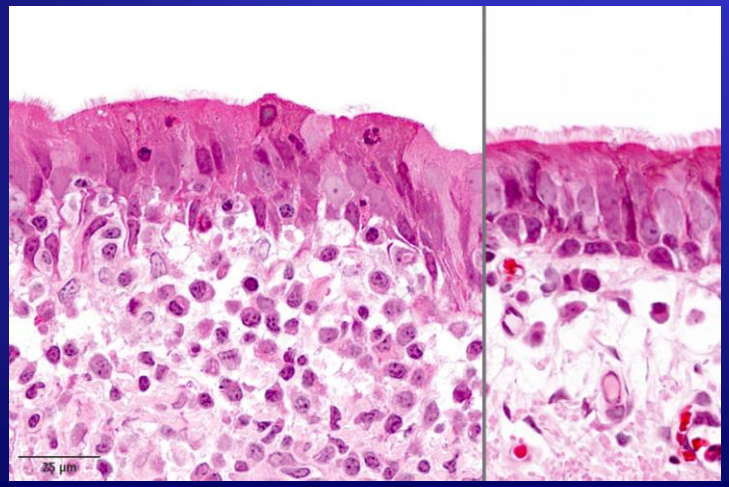
PNP

- proliferating and necrotising pneumonia

- severe form of interstitial pneumonia characterized by hypertrophy and proliferation of pneumocytes type 2 and presence of necrotic cells



PNP

- proliferating and necrotising pneumonia

- in the early 1990´s PCV2 along with PRRSV and influenza was thought to be clearly associated PNP

- present research differs with this opinion

PNP

- retrospective study on 74 cases:

Grau-Roma et Segáles, Vet. Microbiol. (2007): 119, 144-151

- PCV2 only:	39.1%
- PRRSV only:	4.1%
- SIV only:	0%
- ADV only:	0%
- PCV2 + PRRSV:	40.5%
- PCV2 + SIV:	4.1%
- PCV2 + ADV:	1.4%
- al least one virus:	89.2%
- none:	10.8%

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PRDC

- affects growing and finishing pigs mostely aged around 16-22 weeks

- clinical signs are non-specific and variable:
  - slow growth
  - cough, dyspnoea
  - fever
  - decreased feed efficiency

PRDC

- pneumonia in pigs with PRDC is due to a combination of both viral and bacterial agents:
  - PRRSV
  - Swine Influenza
  - M. hyo
  - Pasteurella
  - APP

- role of PCV2 in PRDC involves interaction or synergism with other respiratory pathogens

PRDC

pathogen	detection	
PCV2 and PRRSV	78.4%	TIMINA et al. (2005)
PCV2 and PRRSV	56%	HARMS et al. (2002)
PCV2 and PRRSV	17.7%	CHIOU et al. (2004)
PCV2 and *Mycoplasma hyopneumoniae*	73.7%	CHIOU et al. (2004)
PCV2 and *Mycoplasma hyopneumoniae*	19%	HARMS et al. (2002)
PCV2 and Influenza	12%	HARMS et al. (2002)
PCV2 and *Pasteurella multocida*	74.5%	CHIOU et al. (2004)
PCV2 and *Haemophilus parasuis*	55.5%	TIMINA et al. (2005)

PRDC

- diagnosis:

  - respiratory signs
  - pulmonary microscopic lesions:
    bronchointerstitial pneumonia
  - presence of PCV2 within this lesions
  - absence of characteristic microscopic lesions of PMWS in lymphoid tissues

- differentiation from PMWS by clinical and histopathological investigation

own investigations

- 400 animals from 138 farms
- 109 pigs without clinical symptoms
- 291 pigs with clinical symptoms of pneumonia
- clinical examination
- bronchoalveolar lavage

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- 400 animals from 138 farms
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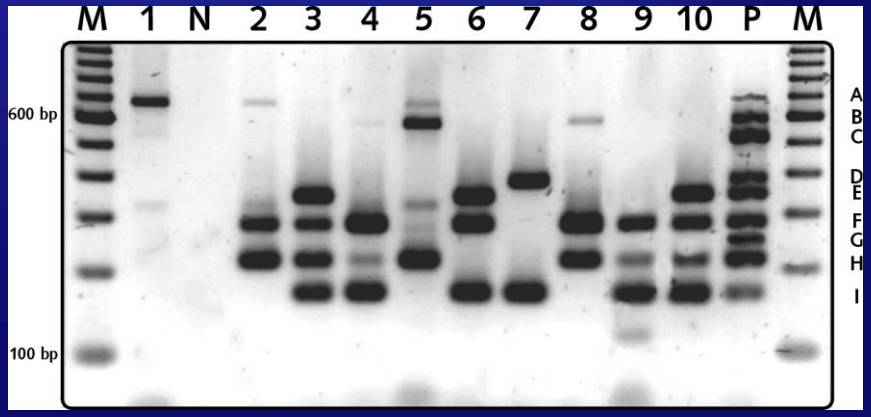
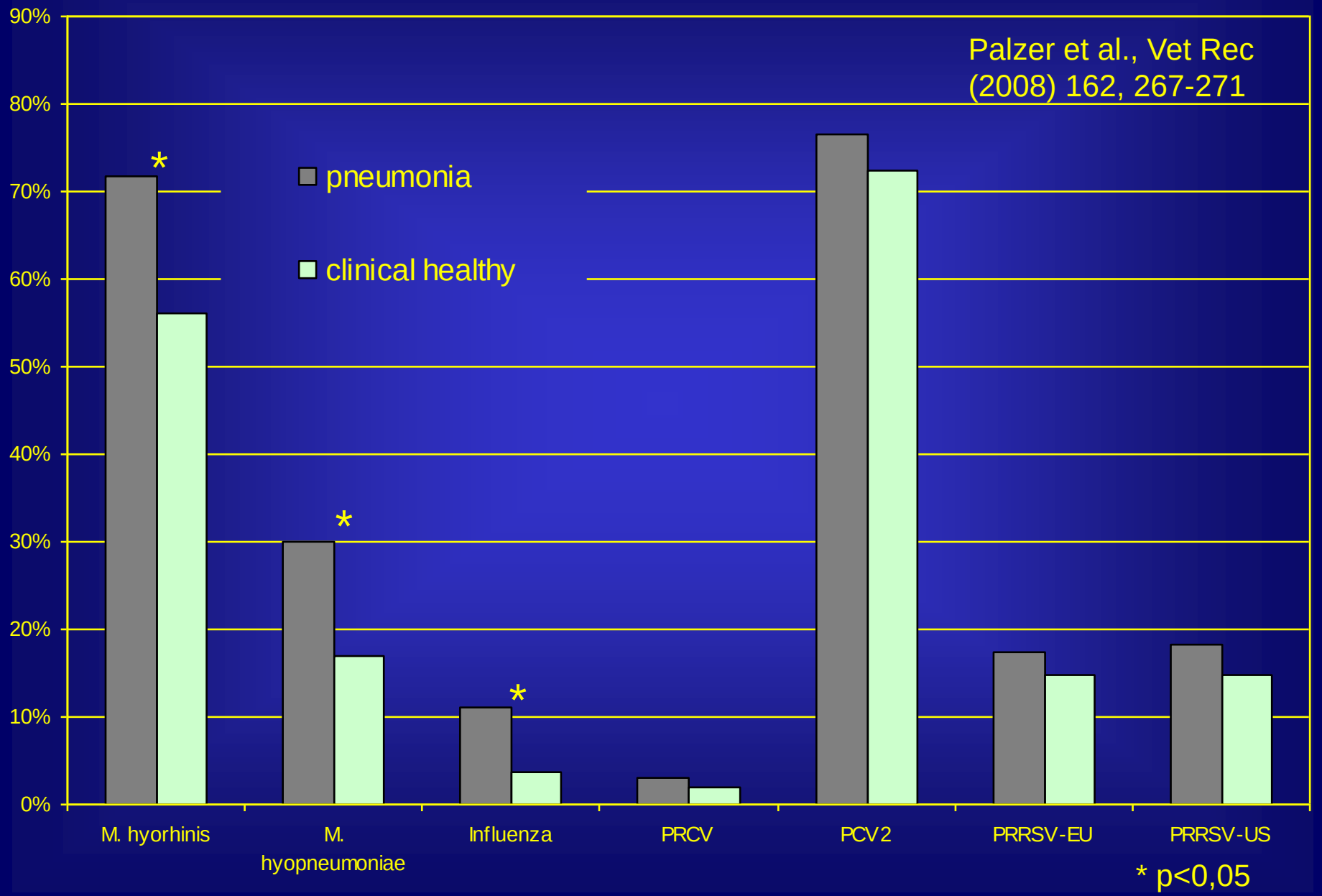
- clinical examination
- bronchoalveolar lavage
- bacteriological and molecularbiological examinations of BALF*

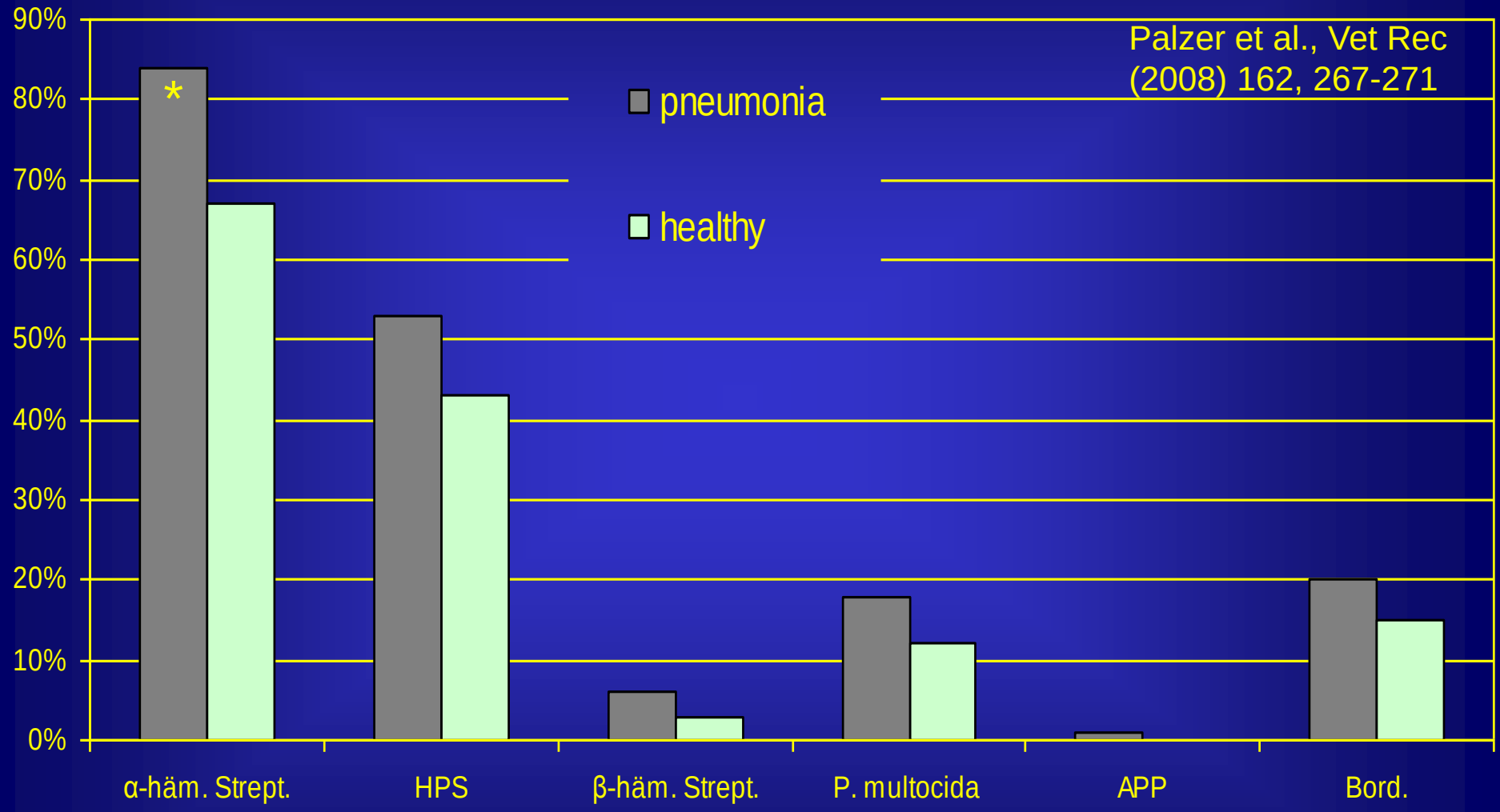
(*Institute for Medical Microbiology LMU and Central Veterinary Diagnostic Laboratory Neumünster)



positive samples (BALF) from PCR



percentage bacteriological positive BALF samples



* p<0,05

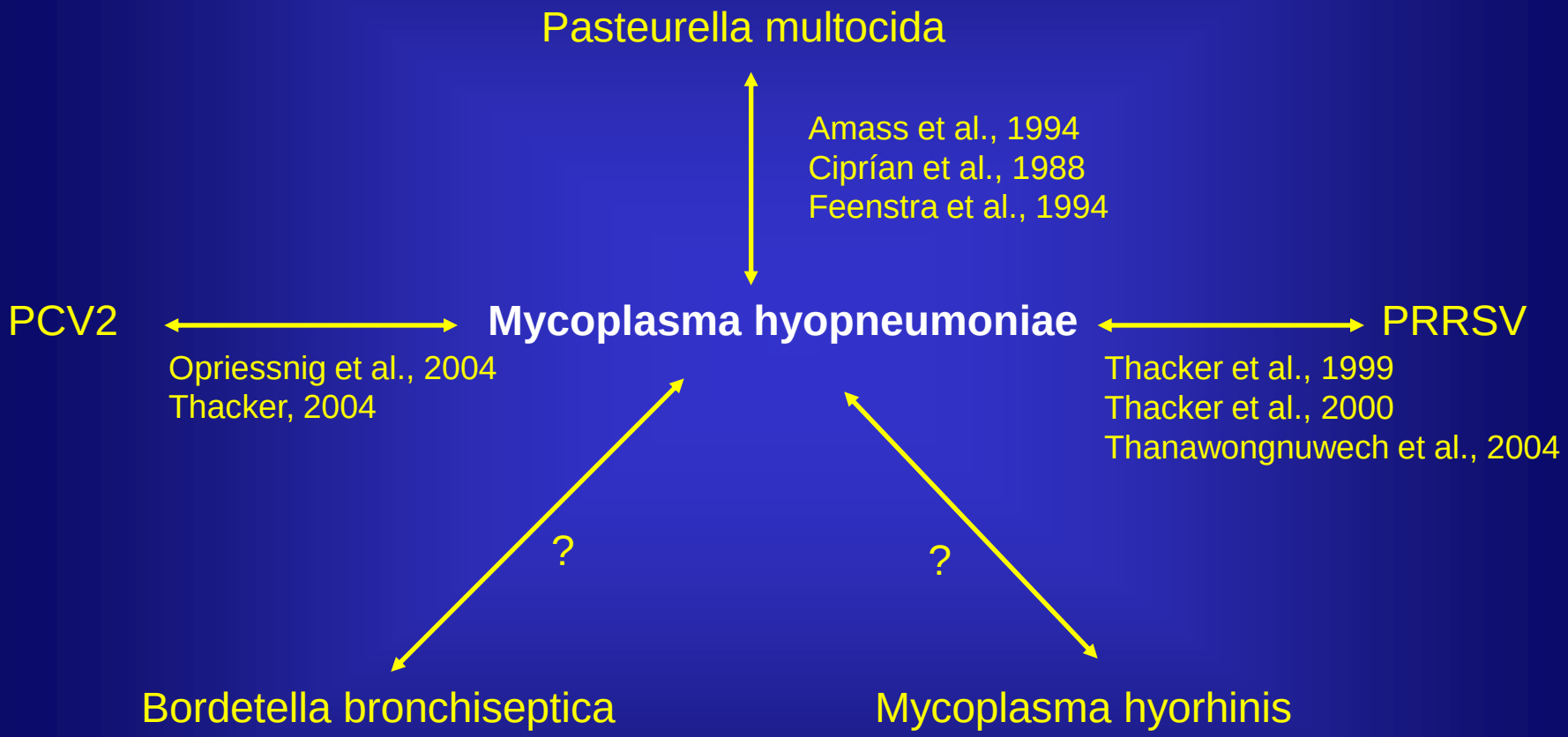
results

- all infectious agents occur more often in pigs with pneumonia than in clinical healthy pigs
- but significant differences were found for:
  - Mycoplasma hyopneumoniae
  - Mycoplasma hyorhinis
  - Influenza virus Type A
  - α-haemolytic Streptococcus
- PCV2, Mycoplasma hyorhinis and α-haemolytic Streptococcus were most frequently isolated in BALF

described association of pathogens

- Mycoplasma hyopneumoniae and Pasteurella multocida
- Pasteurella multocida and Bordetella bronchiseptica
- PRRSV (EU-Type) and Pasteurella multocida
- PCV2 and Pasteurella multocida
- Mycoplasma hyopneumoniae and Bordetella bronchiseptica
- PRRSV (EU-Type) and Mycoplasma hyopneumoniae
- PCV2 and Mycoplasma hyopneumoniae
- PCV2 and PRRSV
- Pasteurella multocida and α-hämolytic Streptococcus
- Pasteurella multocida and Mycoplasma hyorhinis
- Bordetella bronchiseptica and α-hämolytic Streptococcus
- Mycoplasma hyorhinis and α-hämolytic Streptococcus
- Mycoplasma hyorhinis and Mycoplasma hyopneumoniae
- Bordetella bronchiseptica and Mycoplasma hyorhinis
- Influenzavirus Typv A and Mycoplasma hyorhinis

positive pathogen association



Association PCV2 and PRRSV

- 99 pigs from 42 farms

- BALF

- tissue samples (lung, lymph node)

- investigation by PCR

Association PCV2 and PRRSV in tissue samples

	PRRSV positive	PRRSV negative	
PCV2 positive	6	50	n=56
PCV2 negative	0	43	n=43
	n=6	n=93	n=99

p=0,034

results

- interactions were observes between PCV2 and PRRSV and M. hyo

- those interactions in all cases were positive, i.e. the occurrence of M. hyopneumoniae increases the detection of the named agents

clinical research

- 400 animals were clinically examined

a “pneumonia score” was calculated from the results of:

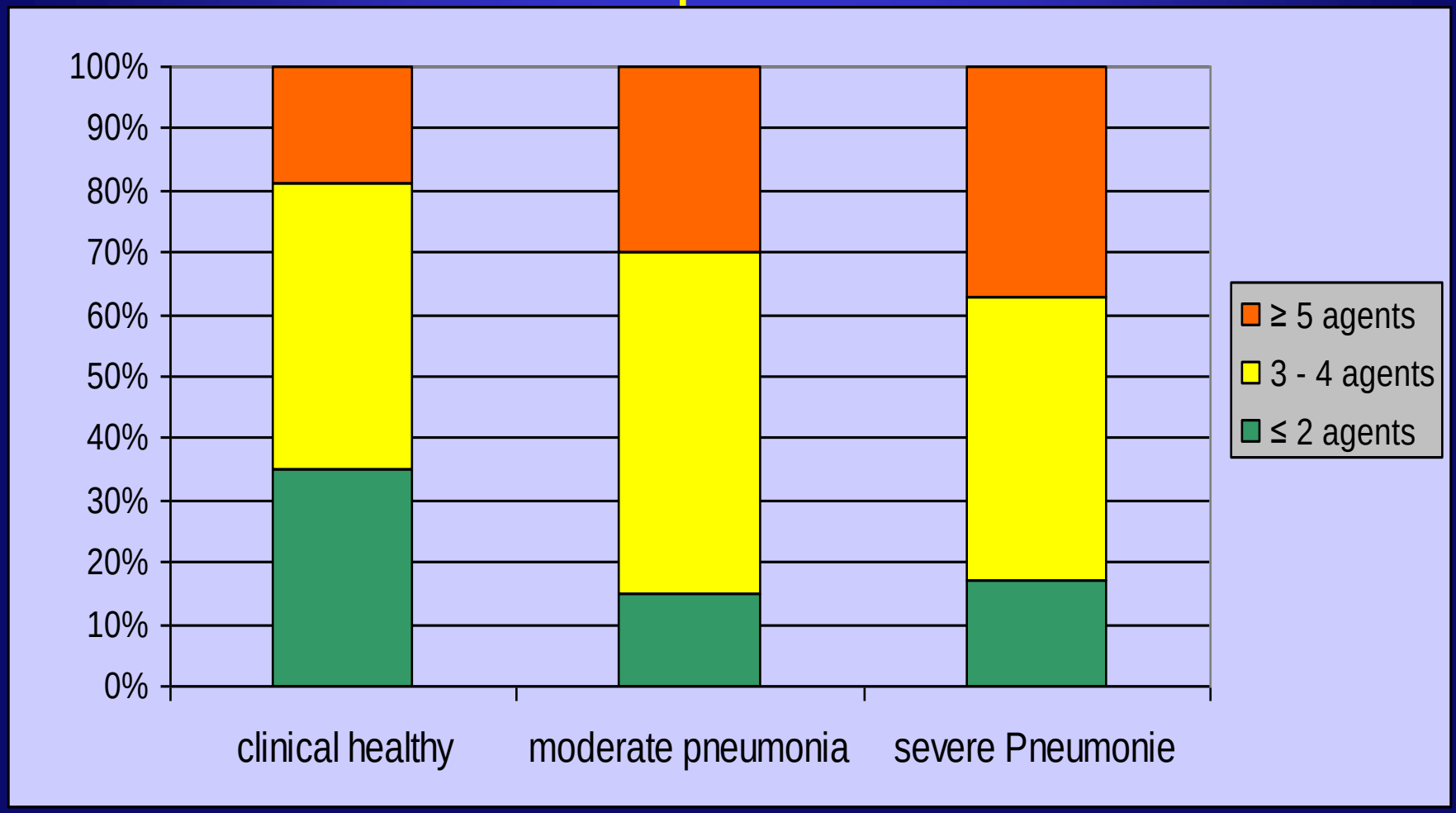
- auscultation
- cough
- body temperature

pathogen correlation with clinical scores

pathogen	significance	Spearman-Rho factor
P. multocida	0,018	0,128
B. bronchi.	0,021	0,125
M. hyopn.	0,002	0,172
M. hyorhinis	< 0,001	0,203
Influenza	0,003	0,162
α-haem. Strep.	< 0,001	0,224

Palzer et al., BMTW (2007) 120, 483-489

multiple infections in animals with bronchopneumonia



clinical research

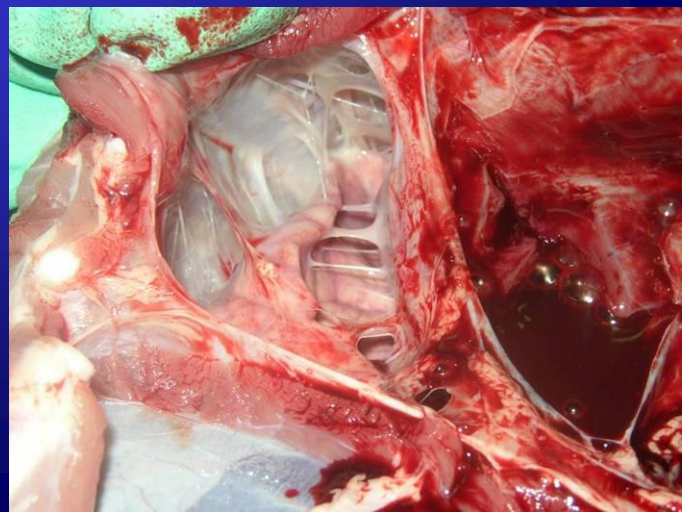
- 223 pigs were necropsied

a “pathology score” was calculated from the results of:

- catarrhalic-purulent bronchopneumonia
- interstitial pneumonia
- pleuritis

correlation of pathogens with the pathology score

pathogen	significance	Spearman-Rho factor
P. multocida	0,009	0,200
B. bronchi.	0,003	0,228
M. hyopn.	< 0,001	0,277
PCV2	< 0,001	0,295
α-haem. Strep.	0,007	0,206



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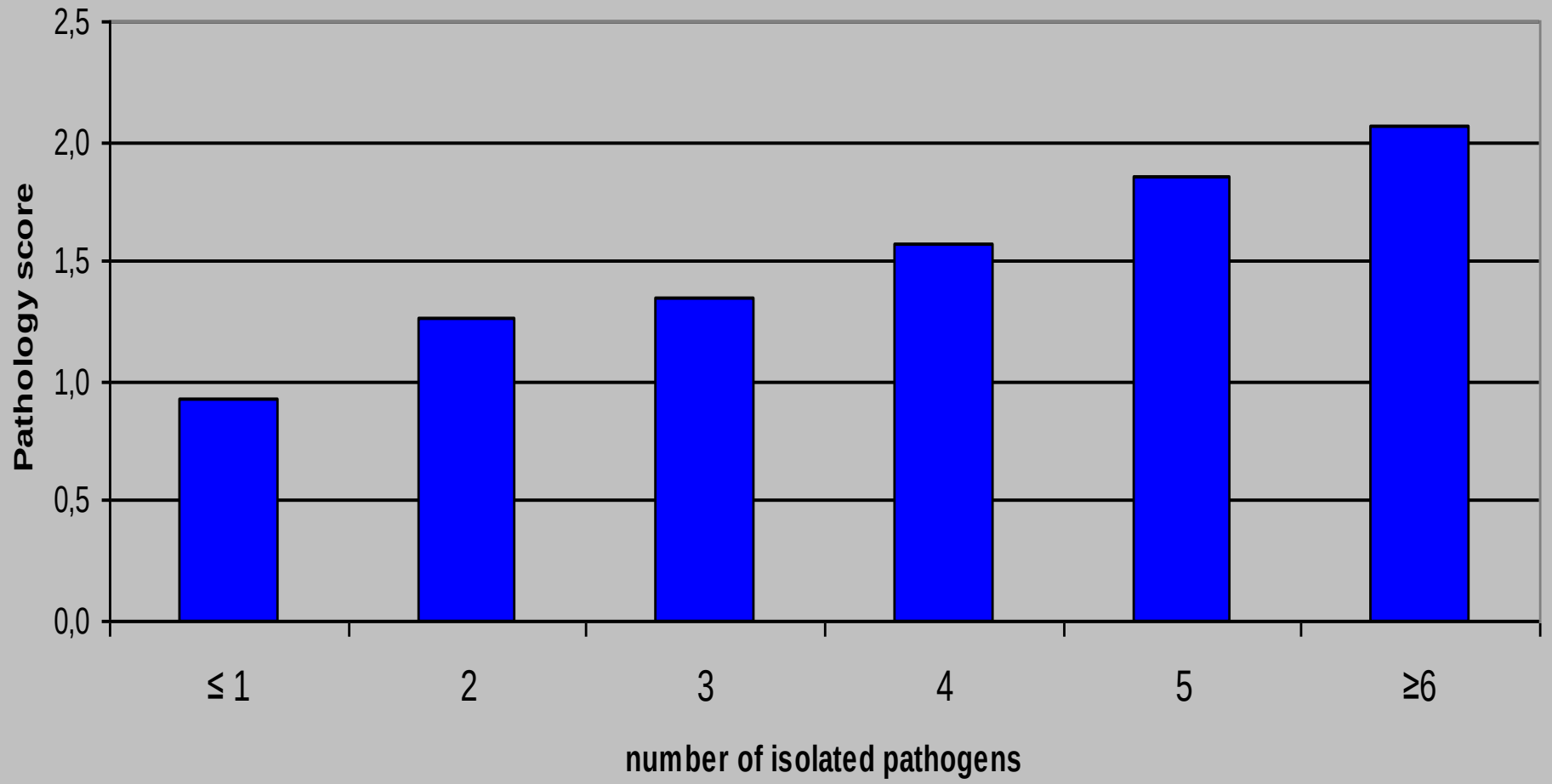


results

- a wide range of different potential pathogens were often isolated

- different pathogens were isolated more frequently with an increasing severity of clinical and pathological signs:
  - Pasteurella multocida
  - Bordetella bronchiseptica
  - Mycoplasma hyopneumoniae
  - α-haemolytic Streptococcus

  - Influenza virus Type A and M. hyorhinis correlates with the clinical score
  - PCV2 correlate with the pathology score

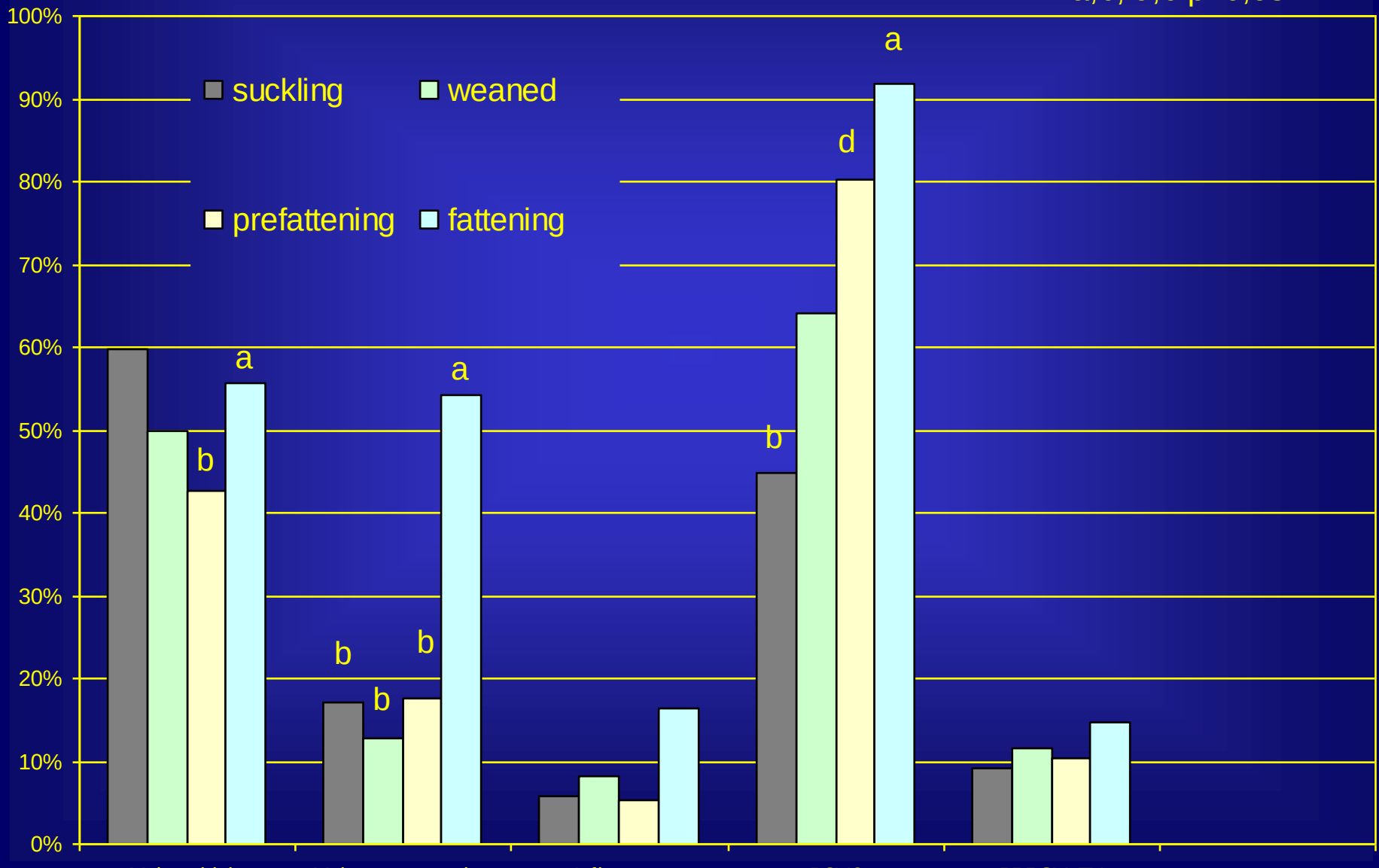
clinical research – infection time

4 age groups were formed:

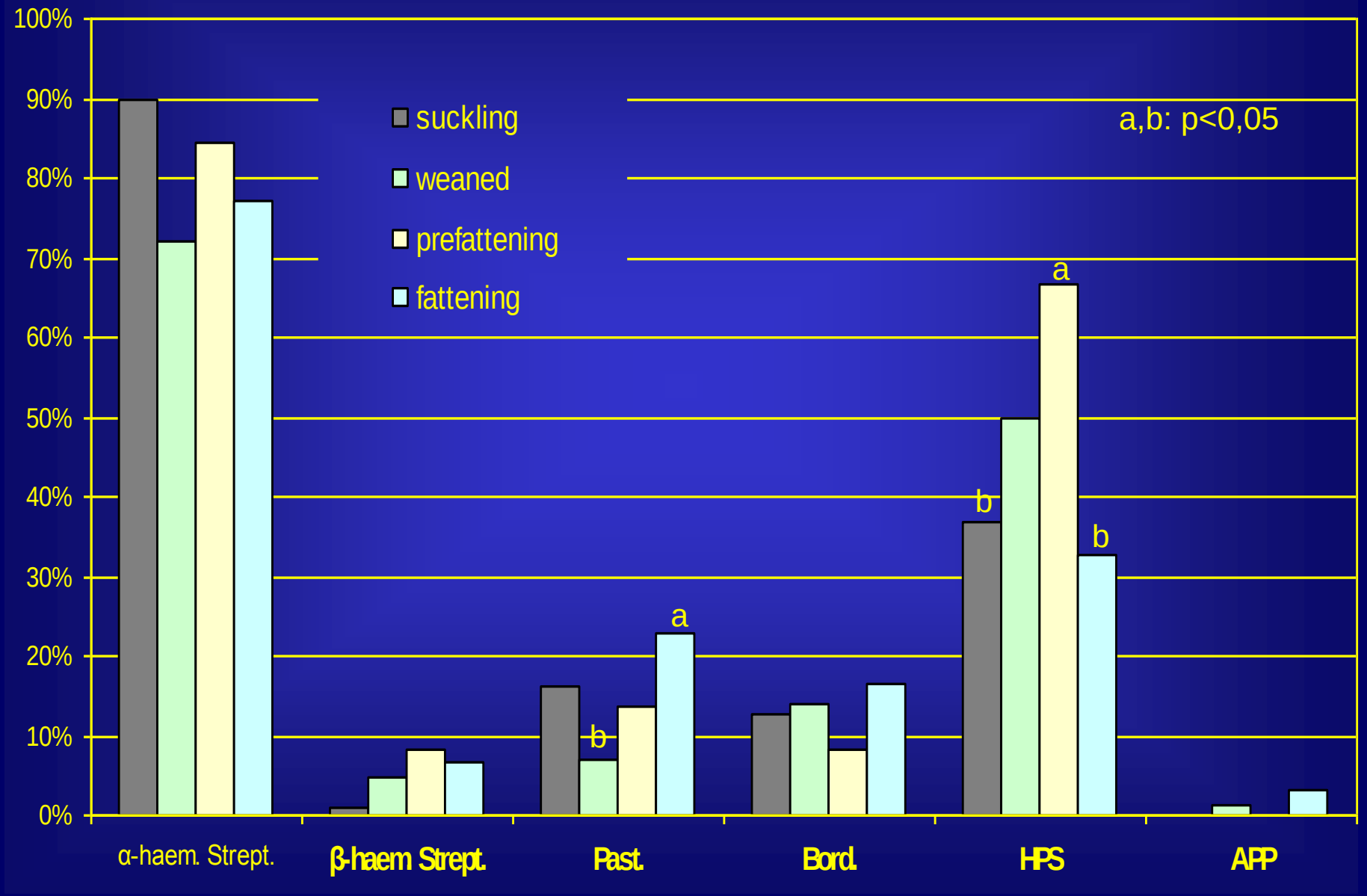
- suckling piglets (<28 days)
- weaned piglets (>28 ≤60 days)
- prefattening pigs (>60 <80 days)
- fattening pigs (≥80 days)

percentage positive samples (PCR) according to different age groups

a,b; d,b p<0,05



percentage of positive bacterial results according to age



conclusion

- PCV2 may result in several syndromes and diseases

- PMWS is the most important PCVD

- PMWS is a multifactorial disease

- clinical signs are non-specific

- clinical diagnosis is therefore not possible, necropsy and virological investigations are necessary

conclusion

- PCV2 is a synergistic pathogen in PRDC cases

- M. hyo and PRRSV are two of the other most common isolated pathogens isolated from pigs with PRDC

- diagnosis is based on clinical and pathohistological investigation

- vaccination against PCV2 is efficient to reduce PRDC

Acknowledgement