Faculty of Agricultural and Nutritional Science

C | A | U

Christian-Albrechts-University Kiel
Institute of Animal Breeding and Husbandry

Session 36

nkemper@tierzucht. uni-kiel.de

Birds as source of important bacterial pathogens in sows in outdoor production

N. Kemper, I. Ziegler

Institute of Animal Breeding and Husbandry
Christian-Albrechts-University
Kiel, Germany

EAAP Meeting 2010, Heraklion, Crete Island, Greece

Introduction

Pigs in outdoor production

- ⇨ **increasing demand for organic pork**
- ⇨ **1% of all sows in Germany in outdoor production**
- ⇨ **pros and cons with regard to infectious diseases:**

infection risk ⇩	infection risk ⇧
low animal density	inadequate hygiene
reduction of stress	easy introduction of pathogens
more roughage	restricted treatment

Introduction

Pigs in outdoor production

⇨ **food safety and zoonoses risks! i. e. bacterial pathogens**

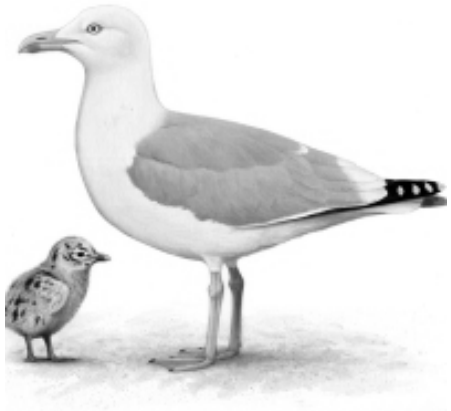
⇨ **pros and cons with regard to infectious diseases:**

infection risk ⇩	infection risk ⇧
low animal density	inadequate hygiene
reduction of stress	easy introduction of pathogens
more roughage	restricted treatment

Material & Methods

Aims of the project

- ⇨ **birds a source of important bacteria in outdoor pig production?**
- ⇨ **qualitative assessment of the bacterial spectrum in outdoor piglet rearing**
- ⇨ **analysis of possible routes of infection**

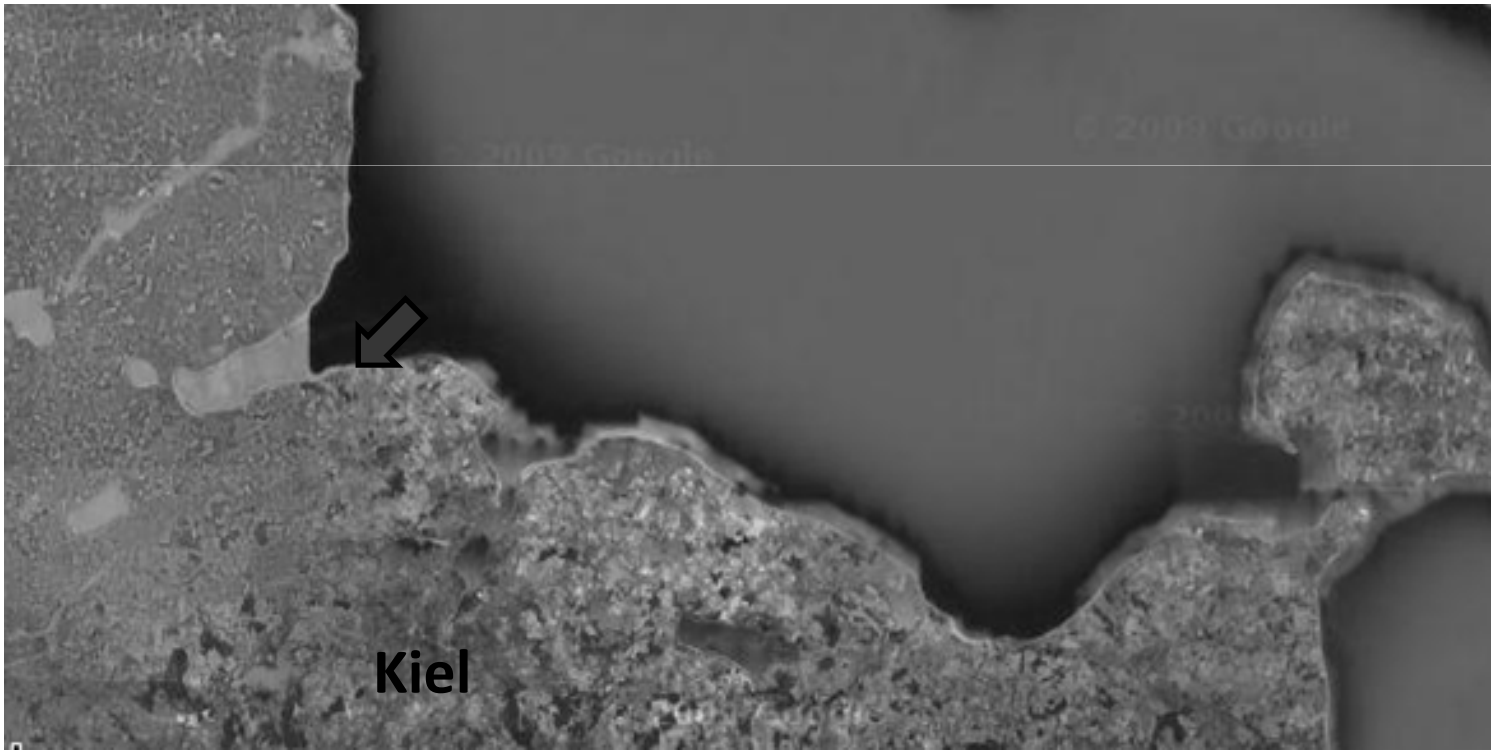


Seagulls (*Larus* spp.)

Material & Methods

Sampling

⇨ **research farm Lindhof, 50 sows in organic outdoor production**

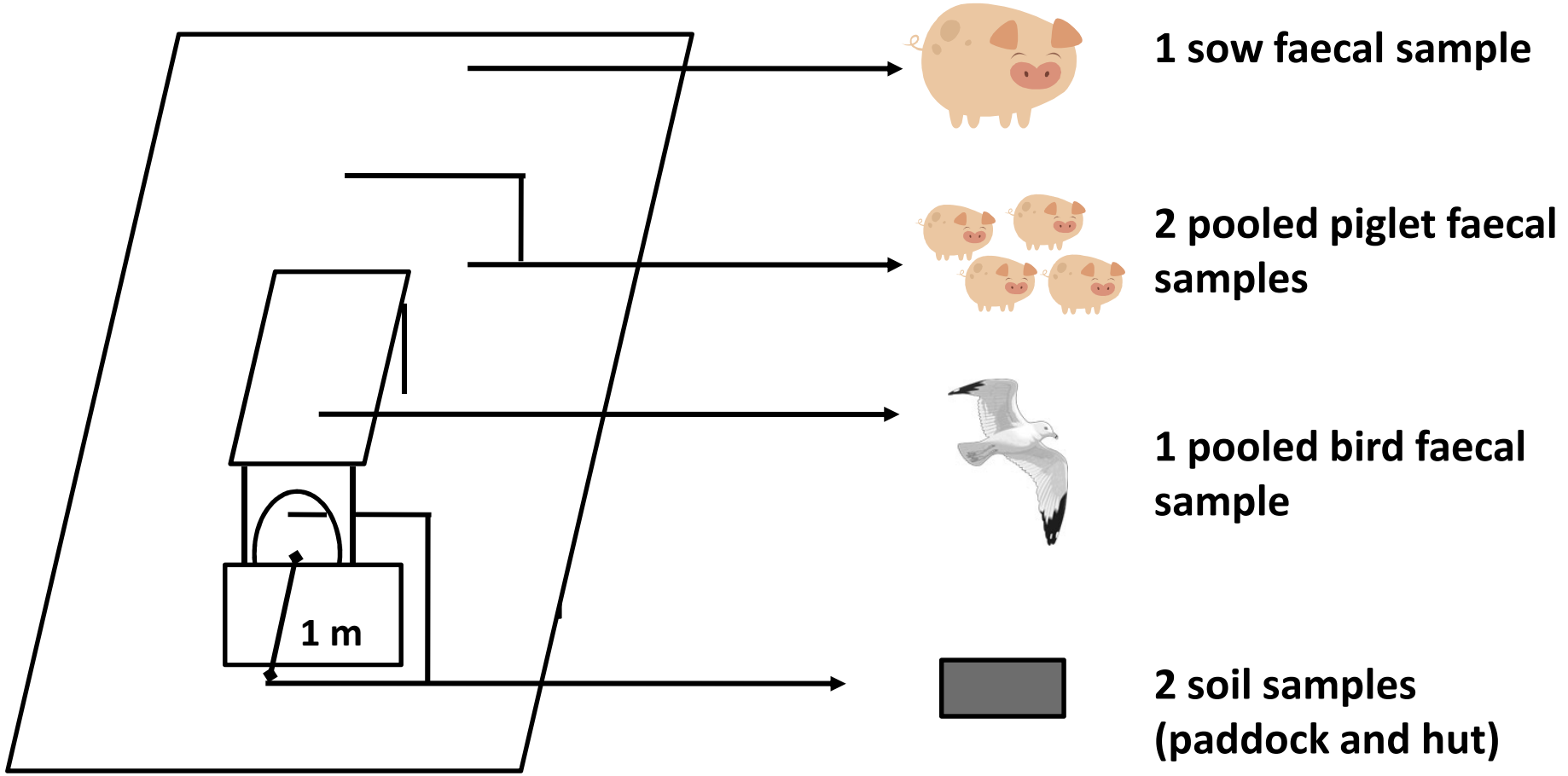


(google maps 2010)

Material & Methods

Sampling

⇨ **5 compartments, 4 sampling dates, 120 samples**



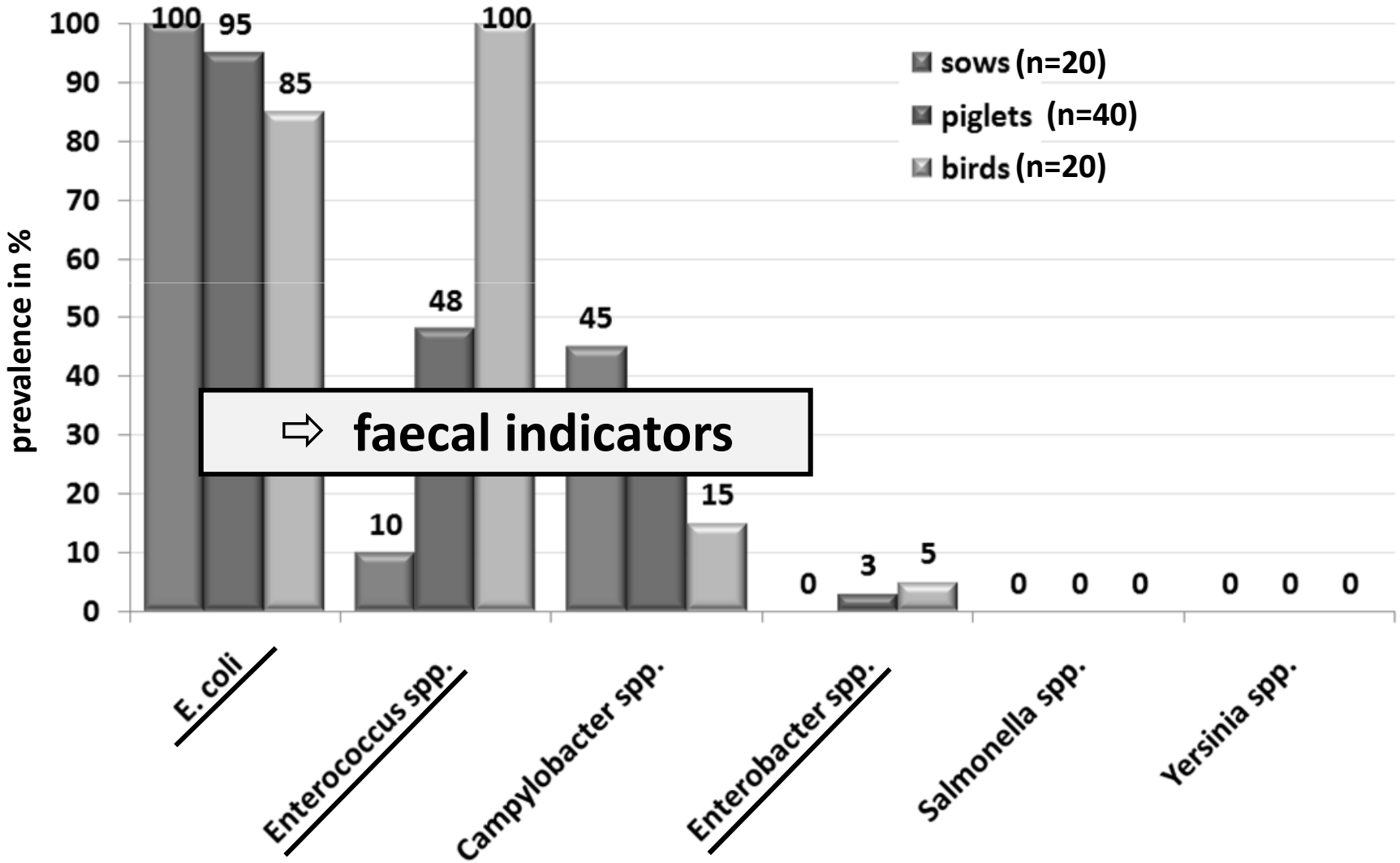
Material & Methods

Bacteriology

- ⇨ ***Escherichia coli*, especially Shigatoxin producing *E. coli* (STEC)**
- ⇨ ***Campylobacter* spp.**
- ⇨ ***Salmonella* spp.**
- ⇨ ***Yersinia* spp.**
- ⇨ **bacteriological analysis with different media and API identification systems, molecular techniques (PCR) and testing for antibiotic resistance**

Results

Faecal samples from pigs and birds



Results

Campylobacter spp. differentiation

⇨ **multiplex-PCR** (Wang *et al*. 2010)

samples	n	*C. coli*	*C. jejuni*	*C. lari*	*C. upsalienis*	*C.* spp.
sows	20	5 (25%)	-	-	-	4 (20%)
piglets	40	11 (27.5%)	-	-	-	-
birds	20	-	1 (5%)	1 (5%)	1 (5%)	-
paddocks	20	-	-	-	-	-
huts	20	1 (5%)	-	-	-	-

⇨ **two separate *Campylobacter*-cycles:**

pigs - *C. coli*

birds - *C. jejuni*, *C. lari* and *C. upsaliensis*

Results

Shigatoxin producing *Escherichia coli* (STEC)

⇨ **PCR for genes encoding Shigatoxin 1, Shigatoxin 2, Intimin and Haemolysin** (Menrath *et al*. 2010)

E. coli isolates	n	*stx1*	*stx2*	*eae*	*hly*	*eae+hly*
sows	20	-	-	-	-	-
piglets	38	1 (2.6%)	-	1 (2.6%)	-	1 (2.6%)
birds	17	-	-	2 (11.8%)	-	-
paddocks	20	2 (10%)	-	-	-	-
huts	20	2 (10%)	-	-	-	-

⇨ **no STEC with full virulence profile**

Results

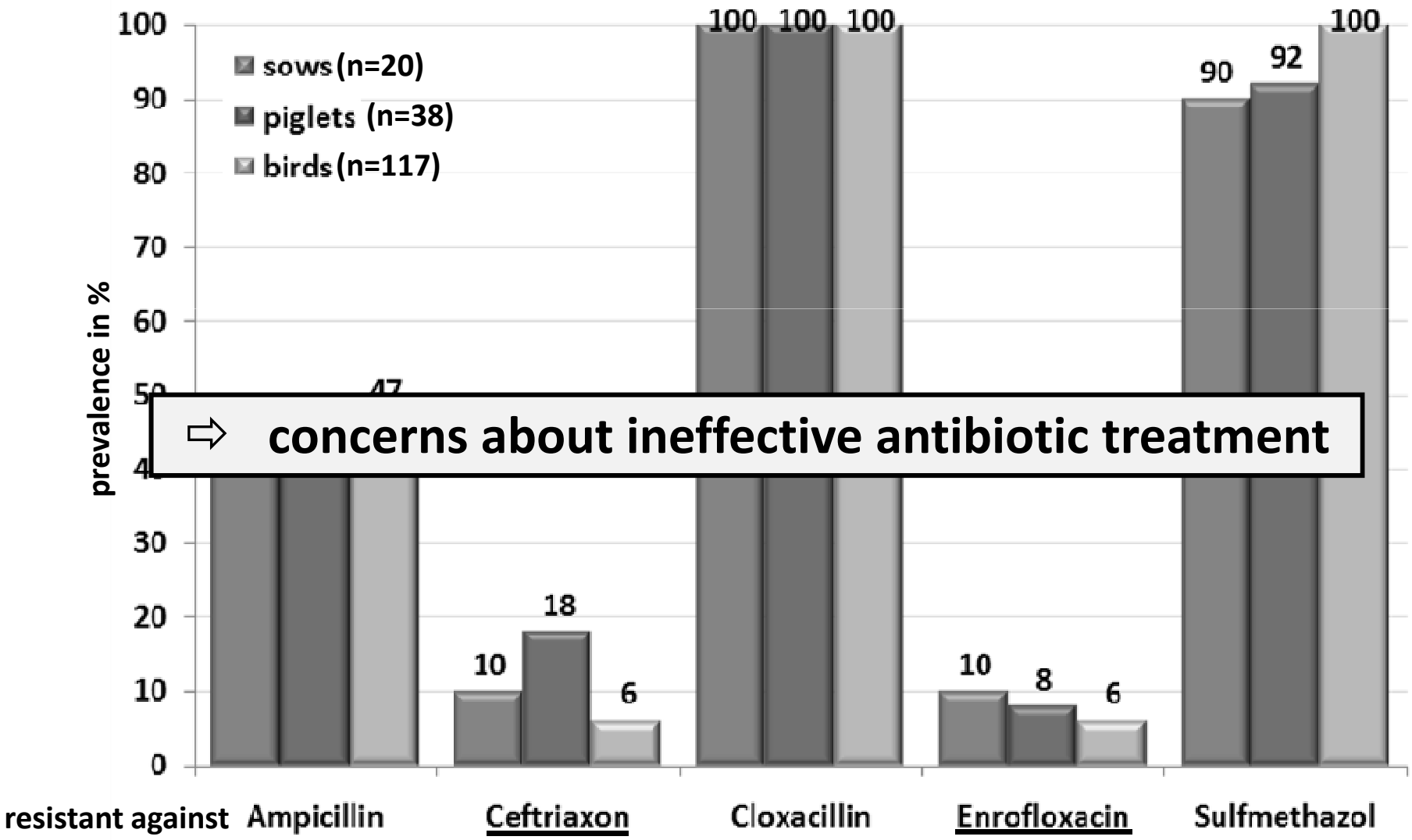
Escherichia coli antibiotic resistance

⇨ **resistance testing against Ampicillin, Ceftriaxon, Cloxacillin, Doxycyclin, Enrofloxacin, Streptomycin, Sulfmethaxol and Tetracyclin**

E. coli isolates	n	sensitive	single-resistant	multi-resistant
sows	20	-	1 (5%)	19 (95%)
piglets	38	-	-	38 (100%)
birds	17	-	-	17 (100%)
paddocks	20	1 (5%)	-	19 (95%)
huts	20	-	-	20 (100%)
total	115	1 (0.9%)	1 (0.9%)	113 (98.3%)

Results

Resistant *Escherichia coli*-isolates in faecal samples



Discussion

Birds as risk for outdoor pig production?

⇨ **different *Campylobacter* spp. in pigs and birds**

in accordance with other studies (Alter *et al*. 2005; Jones 2001; Moore *et al*. 2002)

⇨ **no STEC-strains, no *Salmonella* spp., no *Yersinia* spp.**

⇨ **multi-resistant *Escherichia coli* present in all samples**

⇨ **in this study, birds do not pose a risk to pigs‘ or consumers‘ health**

Conclusions

Zoonotic pathogens in outdoor production

- ⇨ **food safety aspects should not be neglected even though they are inconsistent with the public image of organic livestock production**
- ⇨ **thorough analysis of possible risks**
- ⇨ **proper communication**

⇨ **prevent setbacks in animal welfare improvement**

Farm

Key figures

age at 1. occupancy	**300 d**
conception rate after 1. occupancy	**50%**
abortions after 5. week of gestation	**3%**
weaning-hogging-interval	**5 d**
return-to-heat-rate	**35%**
piglets' weaning age	**6 weeks**
born piglets per sow	**12.7**
rate of stillborn piglets	**13.8%**
rate of crushed piglets	**16.8%**
weaned piglets per sow	**8.8**