

PÕRSASTE VÕÕRUTUSJÄRGSE KÕHULAHTISUSE ENNETAMINE, TSINKOKSIIDI KUI VETERINAARRAVIMI ALTERNATIIVID

Julia Jeremejeva

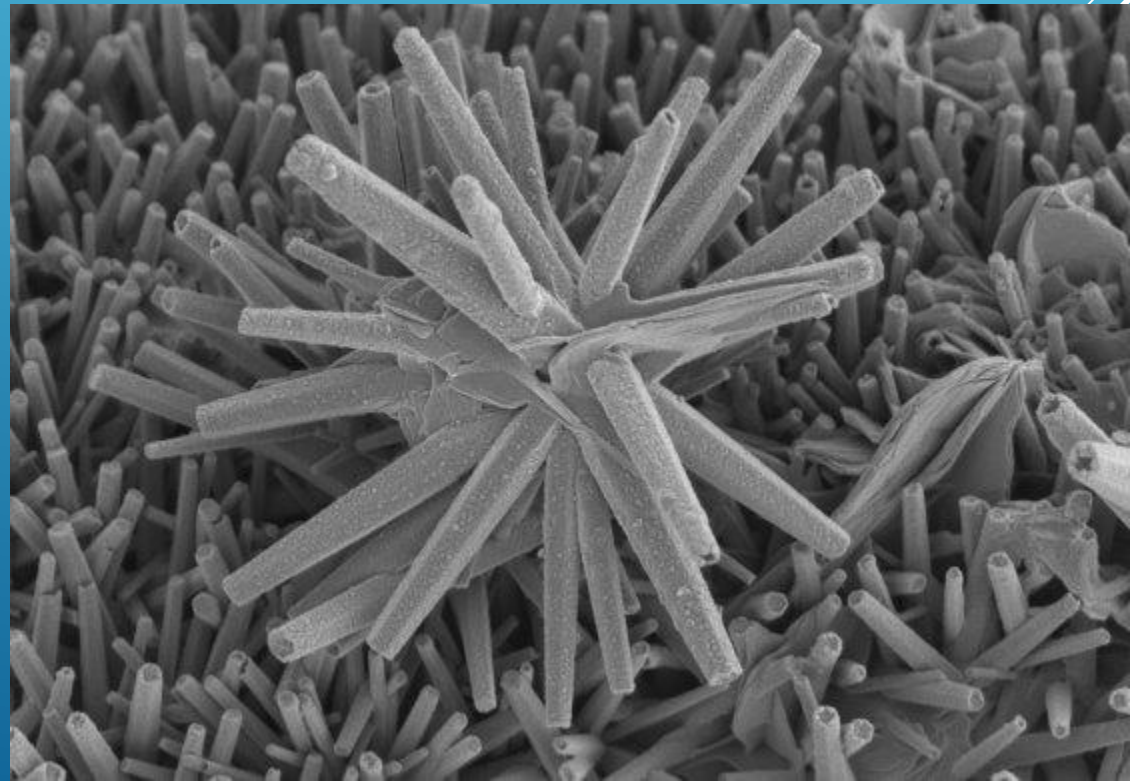
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Euroopa Maaelu Arengu
Põllumajandusfond:
Euroopa investeeringud
maapiirkondadesse

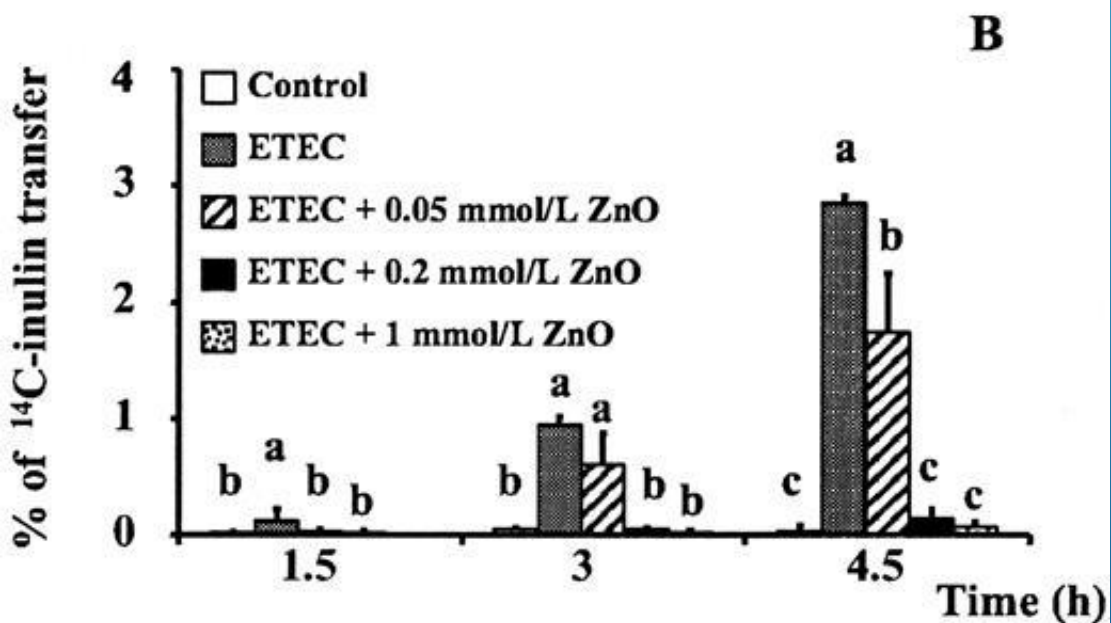
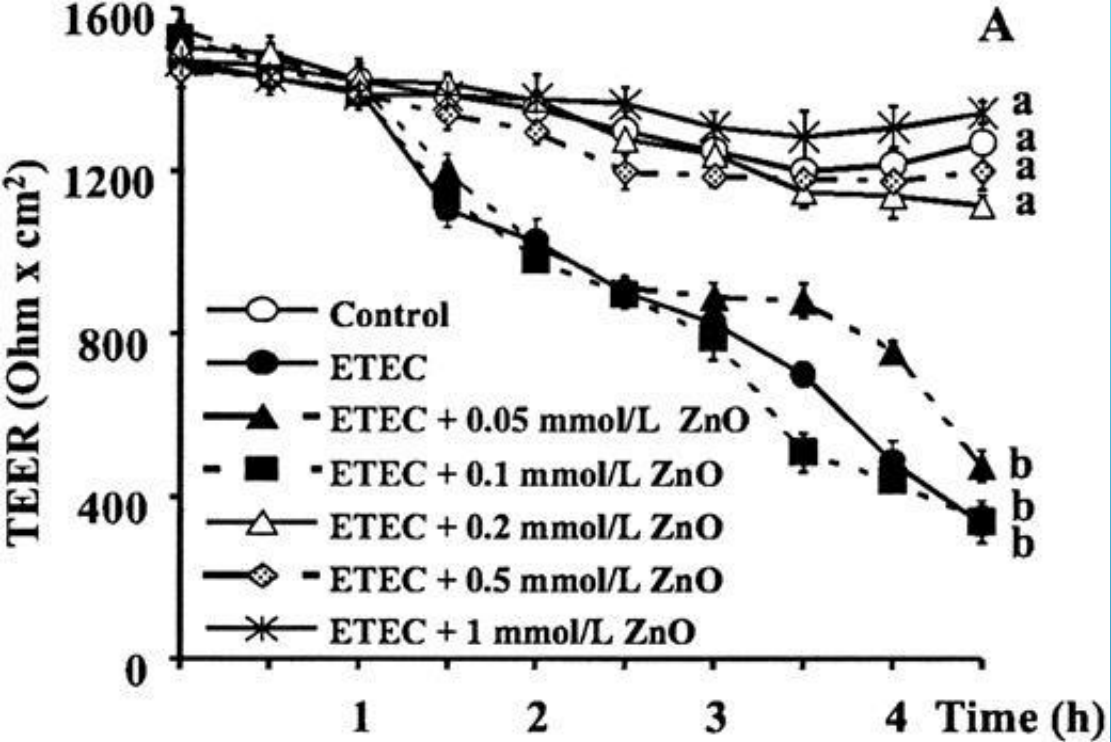
- ▶ Vajalik mikroelement, 'growth promoter' (< 150 ppm)
- ▶ Võõrutusjärgse diarrhõa ja tursetõve metafülaktika (2,500 ppm zinc; 3,100 ppm zinc oxide)
- ▶ Odav
- ▶ Väga efektiivne
- ▶ Täpne toimemehhanism ei ole teada

TSINKOKSIID



	Magu	Niudesool	Pimesool	Jämesool
pH - Zn 100	3.7	5.8	6.7	6.6
pH – Zn 2500	3.9	7.5*	6.3*	6.4
Coliforms Zn 100	5.0	7.5	8.0	8.1
Coliforms Zn 2500	6.2*	7.6	8.8*	8.8*
Enterococci Zn 100	3.4	4.3	4.3	4.5
Enterococci Zn 2500	4.8*	5.6*	5.7*	5.8*
Lactobacilli Zn 100	9.0	9.0	9.2	9.6
Lactobacilli Zn 2500	8.0*	7.5*	8.2*	8.3*

TSINKOKSIIDI MÕJU SEEDETRAKTI MIKROFLOORALE
HØJBERG AND OTHERS (2005)



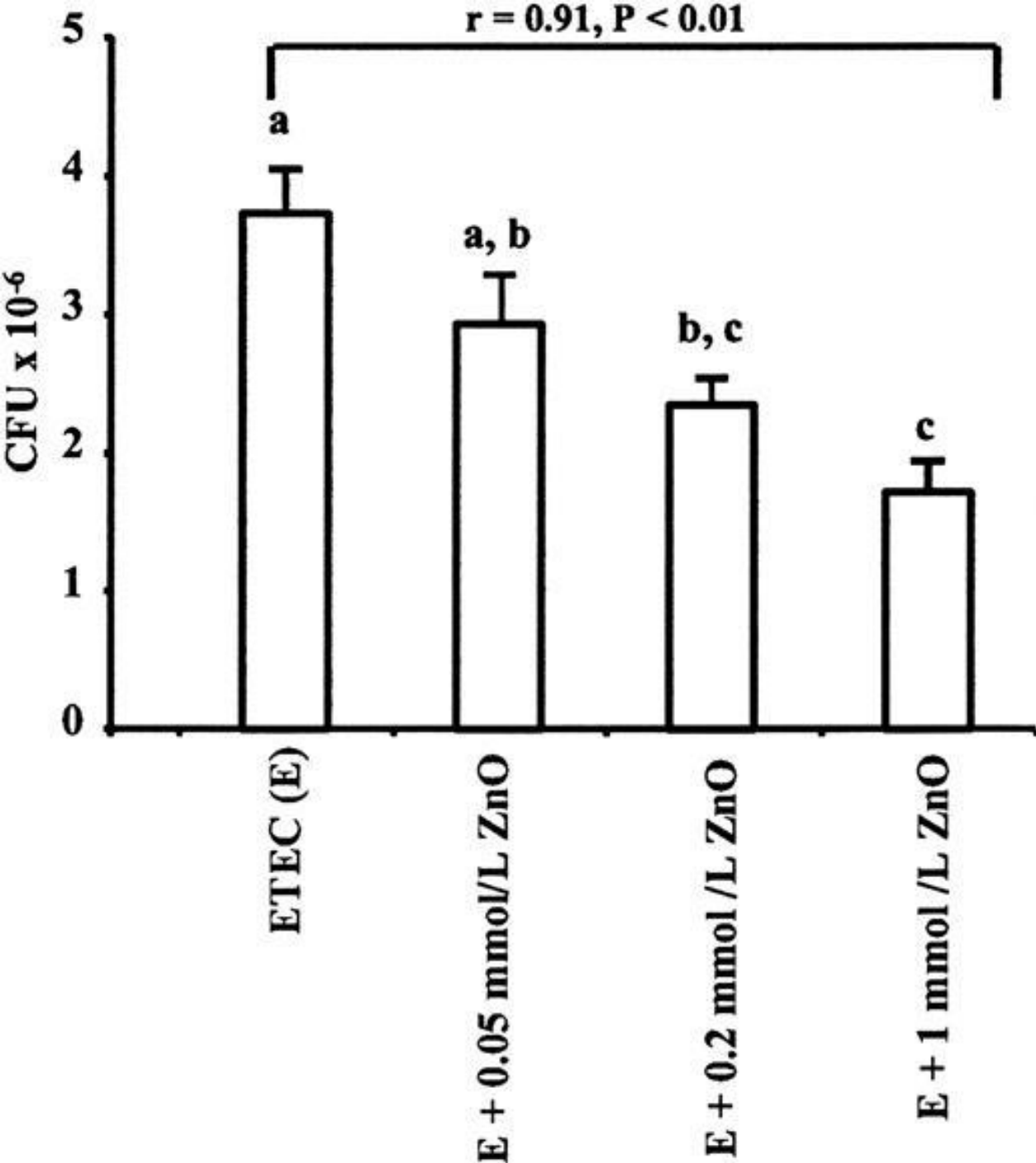
Tsinkoksiidi (ZnO) kaitsev toime suurenenud membraani läbilaskvuse inhibeerimisel, mida põhjustab enterotoksigeenne *E. coli* (ETEC) Caco-2 rakkudes.

Transepiteliaalset elektrilist takistust (TEER, paneel A) mõõdeti iga 30 minuti järel, 0 kuni 4,5 tundi.

Apikaali protsent basolateraalse ¹⁴C-inuliini siirdamise kohta (paneel B) määrati pärast 1, 3 ja 4,5 tundi ETEC ja ZnO töötlemist.

Väärtused on viie sõltumatu katse keskmised ± D kolmel korral (n = 15).

Roselli et al. 2003

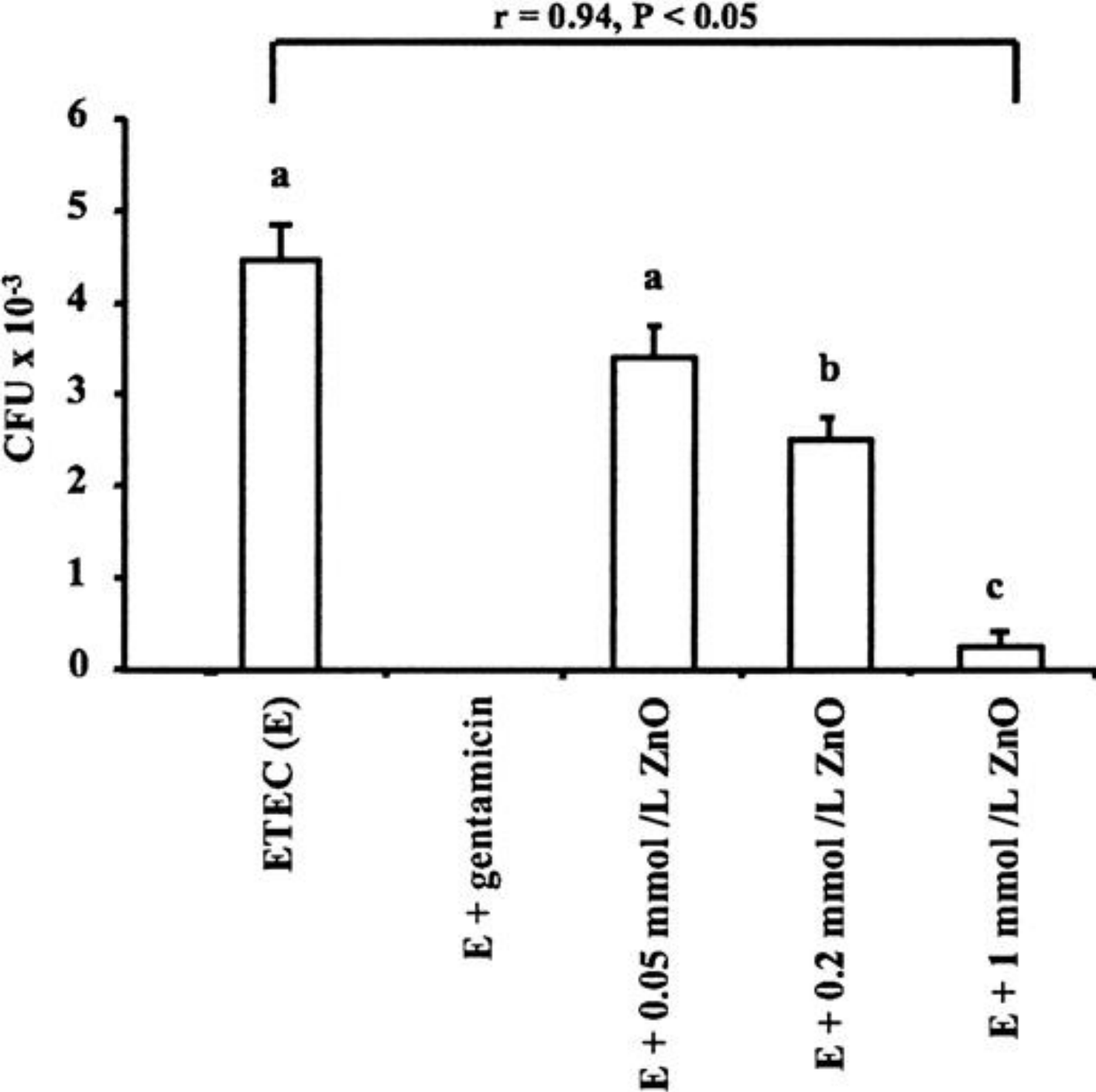


Enterotoksigeense *E. coli* (ETEC) adhesiooni vähenemine Caco-2 rakkudele tsinkoksiidi (ZnO) abil.

Kleepuvate bakterite arv on esitatud kolooniaid moodustavate ühikutena (CFU).

Andmed on kolme sõltumatu katse keskmised \pm D kolmel korral (n = 9).

Roselli et al. 2003



Caco-2 rakkude enterotoksigeense *E. coli* (ETEC) invasiivsuse vähendamine tsinkoksiidiga (ZnO).

24-augulistel plaatidel kasvatatud rakke töödeldi (kontrolliti) või töödeldi ETEC-ga (1×10^8 raku süvendi kohta) ja mitmesuguste ZnO kontsentratsioonidega 1,5 tundi, seejärel gentamütsiinsulfaadiga (50 mg / l) veel 2,5 tundi. Ekstratsellulaarsete bakterite surmamise kontrolliks lisati mõnedele rakkudele koos ETEC-ga gentamütsiin 0 tundi.

Elujõuliste internaliseeritud bakterite arv on esitatud kolooniat moodustavate ühikutena (CFU).

Andmed on kolme sõltumatu katse keskmised \pm D kolmel korral ($n = 9$).

- ▶ Adsorbeeritakse ainult 14% tsingist, 86% väljutatakse välaheidetega
- ▶ Praktiliselt mittelahustuv metall
- ▶ Akumuleerimine mullas
- ▶ Ohtlik keskkonnale

TEURAPEUTILISE DOOSI ZN OKSIIDI
KASUTAMISE TEINE POOL





- ▶ Aarestrup and others, 2010 leidsid seost Zn kasutamisel methicillin-resistent Staphylococcus aureus (MRSA) CC398 esinemisega Taanis - 74% Taani MRSA mecA geeniga olid resistentsed ja Zn suhtes
- ▶ 2013 Saksamaal Bednorz et al. leidsid kõrgemat multiresistentse E. coli esinemissagedust sigedel, keda söödeti tsinkoksiidiga võrreldes kontrollgruppiga
- ▶ 2014 Kanadas (Medardus and others, 2014) - uuring 36 sigalatega. Leiti, et *Salmonella* spp, mis geneetiliselt oli multiresistentne amoksitsiliini, kloramfenikooli, streptomütsiini, sulfonamiidide ja tetratsükliinide suhtes, omas suuremat riski olla resistentne ka Zn suhtes, võrreldes teiste multi-resistentuse geenidega.

TEURAPEUTILISE DOOSI ZN OKSIIDI KASUTAMISE TEINE POOL



EL 2022

- ▶ Enzüümide kofaktor – kasv ja söödaenzüümid
- ▶ Valgete vererakkude normaalne funktsioneerimine
- ▶ Hormoonide ja reproduktiivtrakti töö
- ▶ Naha tervis
- ▶ Immuunsüsteem

ZN FUNKTSIOON

	ZnO as a feed additive	ZnO as a veterinary medicinal product (VMP)
EU agency	European Food Safety Authority (EFSA)	European Medicines Agency (EMA)
Legislation	Regulation (EC) No 1831/2003 on additives for use in animal nutrition	Directive 2001/82/EC on veterinary medicinal products + Regulation (EC) No 726/2004
Levels	Max. total 150ppm of zinc (from ZnO and other sources)	Normal dosage ca. 2500ppm
Ban?	No! There is no indication that ZnO will be banned as a feed additive.	Yes! Marketing authorisations for ZnO-based VMPs will be withdrawn the across EU by June 2022.

- ▶ 100mg/kg päevas 14 päeva jooksul – s.e . 2500ppm Zn söödas

- ▶ SPT
- ▶ Probiotikumud
- ▶ Prebiotikumud
- ▶ Tärklis?
- ▶ Happed
- ▶ teised



ALTERNATIIVID

- ▶ **SPT**
- ▶ Probiotikud
- ▶ Prebiotikud
- ▶ Tärklis?
- ▶ Happed
- ▶ teised



ALTERNATIIVID



Y

Socializing piglets before weaning: effects on behavior of lactating sows, pre- and postweaning behavior, and performance of piglets

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Affiliations + expand

PMID: 16971588 DOI: 10.2527/jas.2005-606

Abstract

This study evaluated how socializing piglets before weaning affects behavior of lactating sows and the pre- and postweaning behavior and performance of piglets. Two farrowing rooms, each with 6 pens, and 1 nursery with 4 pens were used. In total, data were obtained from 24 sows and their litters. In each farrowing room, the solid barriers between 3 farrowing pens were removed on d 12 after farrowing, and the sows remained confined in their crates (experimental group). In the other 3 farrowing pens of each farrowing room, sows and their litters were kept under conventional conditions until weaning (control group). All piglets were weaned 28 d after birth. After weaning, piglets from each group remained together in 1 pen of the nursery. The behavior of sows (lying, standing, sitting, nursing) and piglets (lying, active, suckling) in the farrowing rooms was observed for 24 h before and for 48 h after removal of the barriers between the pens. In addition, behavior (active, lying, feeding, agonistic behavior) of piglets was observed in the nursery during the initial 48-h period after weaning. Each piglet was weighed on d 5, 12, and 28 after birth and thereafter weekly until the fifth week of rearing. In the farrowing room, mixing of litters did not influence behavior of piglets and sows. Preweaning weight gain of the piglets did not differ ($P = 0.60$) between the treatments. In the initial 48 h after weaning, less agonistic behavior ($P < 0.001$) was observed in piglets belonging to the experimental group. During 5 wk of rearing, piglets in the experimental group gained more weight compared with the control group ($P = 0.05$). The advantage shown by the experimental group became especially conspicuous in the first week after weaning ($P = 0.05$). By socializing unfamiliar piglets before weaning, stress due to mixing could at least be distanced in time from the other burdens of weaning, thereby improving performance.

- ▶ Söötmine 2 korda päevas ja vähendatud söötmine on seotud PWD kõrgema riskiga ($P = 0.02$)
- ▶ Adekvaatne söötmisala
- ▶ Kõrgem emiste arv
- ▶ Automatiseeritud keskkonnamperatuuri kontroll
- ▶ Hügieeni tase
- ▶ Õhu kvaliteet
- ▶ Paigutustihedus

KESKKONNA TEMPERatuur



Y

Intermittent suckling with or without co-mingling of non-littermate piglets before weaning improves piglet performance in the immediate post-weaning period when compared with conventional weaning

Diana L. Turpin [✉](#), Pieter Langendijk, Kate Plush & John R. Pluske

Journal of Animal Science and Biotechnology **8**, Article number: 14 (2017) | [Cite this article](#)

1857 Accesses | 5 Citations | 0 Altmetric | [Metrics](#)

Abstract

Background

In this experiment, intermittent suckling (IS) with or without the co-mingling (CoM) of piglets was studied as a method to stimulate solid feed intake and reduce post-weaning stress.

Methods

Three weaning regimes using 30 multiparous sows were compared: (1) conventional weaning (CW) ($n = 10$ litters), where piglets had continuous access to the sow until weaning (d 0, farrowing = d -25 relative to weaning); (2) intermittent suckling (IS) ($n = 10$ litters), where piglets were separated from the sow for 8 h/d starting at d -7 (relative to weaning); and (3) intermittent suckling with co-mingling (ISCo) ($n = 10$ litters) where IS started at d -7 and two litters were housed together during separation and then returned to their original sow. Ad libitum creep feed was available from d -17. At weaning pigs were housed in pens of 11 pigs, 27 pens in total. The ISCo treatment was divided in half to examine effects of different mixing

KATKENDLIK VÕÕRUTAMINE
INGLISE KEELES *INTERMITTENT SUCKLING*

Day ¹	Treatment ²			
	CW	IS	ISCoF	ISCoNF
BW, kg				
D 2	7.5 ± 0.23	7.3 ± 0.23	7.3 ± 0.34	7.6 ± 0.31
D 8	8.4 ± 0.24	8.7 ± 0.24	9.0 ± 0.37	9.0 ± 0.33
ADG, g				
D 0 to 2	-25 ± 13.9	-56 ± 13.7	-78 ± 21.6	-48 ± 17.7
D 2 to 8	165 ± 8.6 ^a	234 ± 8.5 ^b	294 ± 13.4 ^c	242 ± 11.1 ^b
ADFI, g				
D 0 to 2	80 ± 5.3	73 ± 5.3	67 ± 7.9	72 ± 7.1
D 2 to 8	192 ± 4.5 ^a	256 ± 4.5 ^b	291 ± 6.7 ^{cy}	269 ± 6.0 ^{b^{cx}}
FCR, g/g				
D 2 to 8	1.2 ± 0.03 ^a	1.1 ± 0.03 ^{ab}	1.0 ± 0.05 ^b	1.1 ± 0.04 ^{ab}

¹Day = day in relation to weaning with weaning = d 0, d -25 is the day on which most the litters were born

²CW = conventional weaning (*n* = 9), IS = intermittent suckling (*n* = 9), ISCoF = intermittent suckling with co-mingling, familiar pigs (*n* = 4), ISCoNF = intermittent suckling with co-mingled, not familiar pigs (*n* = 5)

^{ab}Values within a row not having the same superscript are significantly different

^{xy}Values within a row not having the same superscript are a trend

- ▶ ISCo Söövad rohkem tahket toitu enne vöörutamist ($P < 0.01$), Kuid näitavad rohkem agressiivset käitumist 1. VJP ($P < 0.05$).
- ▶ IS ja ISCo näitavad rohkem uurivat ja mängivat käitumist 1. VJP ($P < 0.001$)
- ▶ Segamine enne vöörutust (ISCoF)– kõrgem ADG ja FI 2-8 VJP ($P < 0.001$).
- ▶ IS ja ISCoNF sõid rohkem ja kasvasid paremini , kui CW 2-8 VJP ($P < 0.001$).
- ▶ ISCo pörsad näitasid vähem nahakahjustusi ($P < 0.05$),





- ▶ Edukalt kasutatakse proteiini vähendamist võõrdepõrsaste ratsioonis (kuni 16.5 – 17.5% või niipalju kui võimalik, et mitte kompromiteerida ratsiooni hinda ja põrsaste kasvu), tasakaalustatud aminohappete koostist ja kergesti seeduva proteiiti allikaid
- ▶ Samuti soovitatakse tõsta väävlit sisaldavate aminohappete (tsüsteiini ja metioniini) suhet lüsiinile kuni 60% - 65%, trüptofaani suhet lüsiinile kuni 21% - 22%, ja treoniini suhet lüsiinile kuni 70% ning tõsta maksimumini trüptofaani suhet suurtele neutraalsetele aminohappetele, et tõsta serotoniini taset

- ▶ SPT
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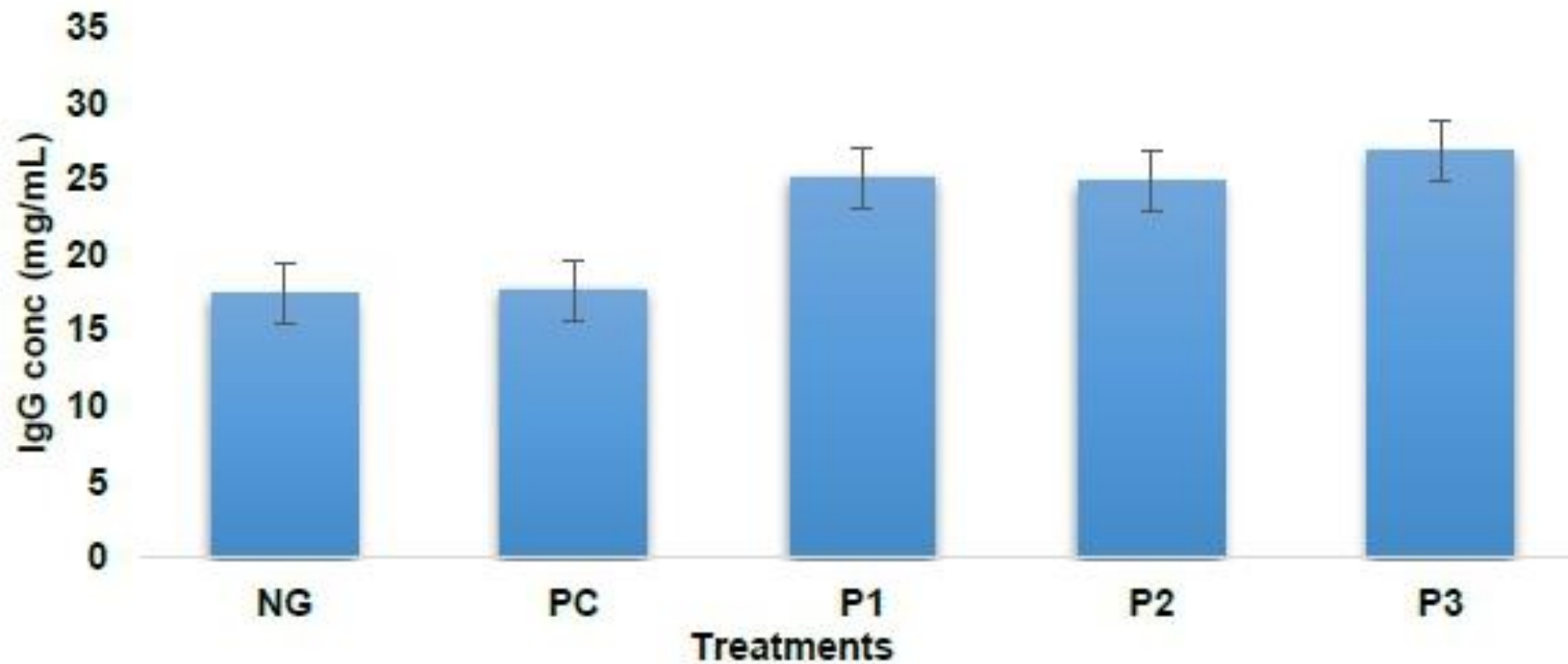


Figure 3 Effect of different treatments on Immunoglobulin G (IgG) stimulation of piglets

NC = Negative control, PC = Positive Control P1 = *L. reuteri* ZJ625, P2 = *S. salivarius* NBRC13956, P3 = Combination of probiotics (*L. reuteri* ZJ625, *L. reuteri* VB4, *L. salivarius* ZJ614 and *S. salivarius* NBRC13956).

Feeding a diet containing resistant potato starch influences gastrointestinal tract traits and growth performance of weaned pigs

J M Heo¹, A K Agyekum², Y L Yin³, T C Rideout⁴, C M Nyachoti⁵

Affiliations + expand

PMID: 25057032 DOI: 10.2527/jas.2013-7289

Abstract

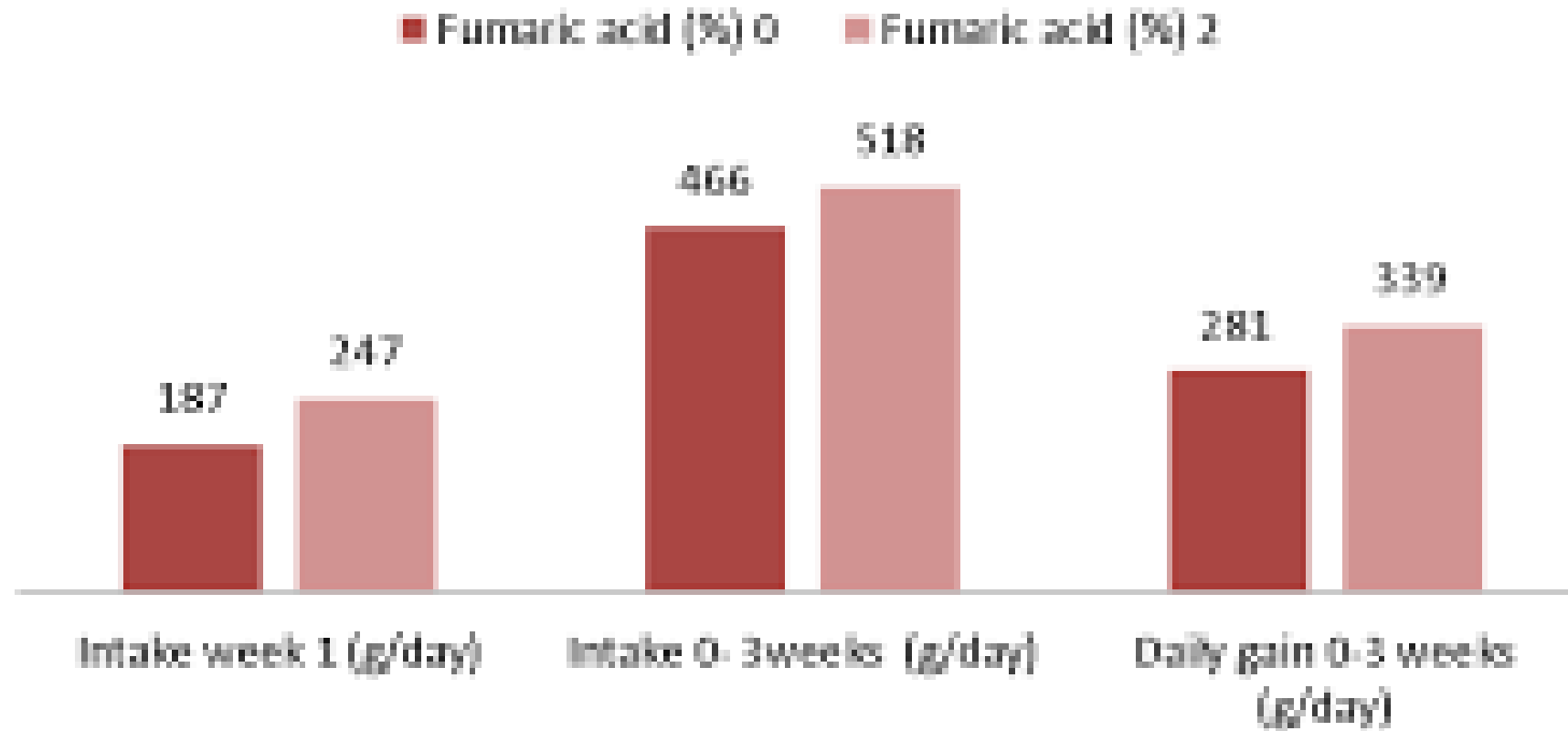
The aim was to evaluate the effects of feeding resistant potato starch (RPS) as a natural source of resistant starch to weaned pigs for 28 d immediately after weaning. Sixty piglets (Yorkshire-Landrace × Duroc) weaned at 21 ± 2 d (1:1 male:female) with an initial BW of 7.2 ± 0.78 kg were assigned in a completely randomized design to 1 of 5 dietary treatments to give 6 observations per treatment and 2 pigs per pen. Dietary treatments consisted of a negative control corn-soybean meal-wheat-wheat middlings-based diet (NC; no antimicrobial agents added) or the NC supplemented with RPS either as powder or in capsules and each included at 0.5 or 1.0% as a top-dressing on each day. Diets were formulated to meet 1998 NRC specifications. Pigs were offered the experimental diets on an ad libitum basis for 28 d and water was available at all times. The ADG, ADFI, and G:F were determined weekly. Fecal score was determined daily for 14 d after weaning. At the conclusion of study, 1 pig from each pen was randomly selected and euthanized ($n = 6$ per treatment) to determine visceral organ weight, digesta pH, VFA, and ammonia N (NH₃-N) concentrations. Resistant potato starch supplementation improved ($P < 0.001$) fecal score, and pigs offered 1.0% RPS had more solid feces ($P < 0.05$) than those offered 0.5% RPS during the first 14 d after weaning, independent of the form of RPS. Resistant potato starch supplementation decreased ($P < 0.05$) ileal and cecal digesta pH regardless of the levels of RPS or mode of delivery. The total VFA concentrations in cecal digesta were greater ($P < 0.05$) but the molar proportion of branched-chain fatty acids were lower ($P < 0.05$) for pigs fed the RPS-containing diets compared with those fed the NC, irrespective of the RPS levels or the form of RPS. However, there were no differences ($P > 0.10$) in visceral organ weights, growth performance, and digestibilities of DM, CP, Ca, and P among treatments. The results of this experiment indicate that supplementing a weaner pig diet with at least 0.5% RPS independent of mode of delivery has the potential to enhance outcomes characteristic of a functional gut in weaned pigs without adverse effects on growth.

- ▶ SPT
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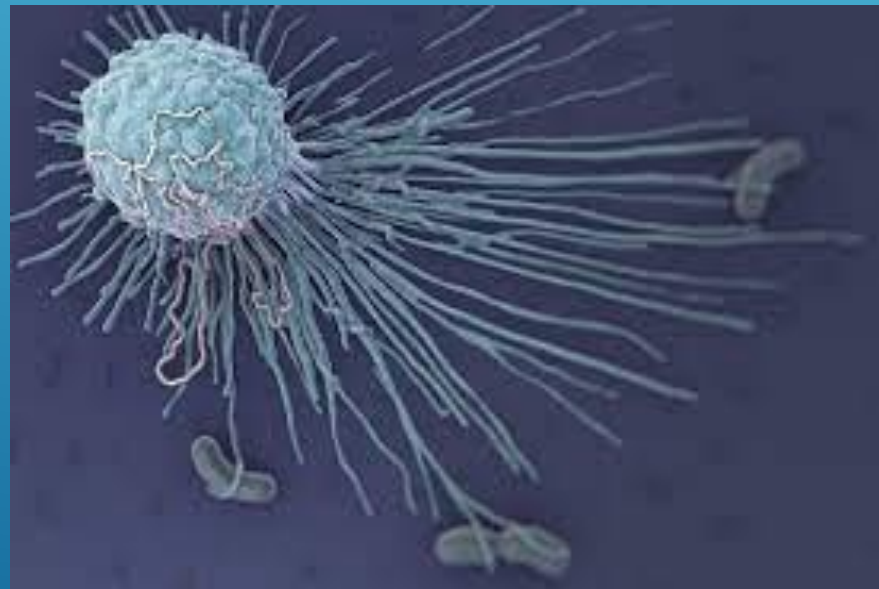


ALTERNATIIVID

Effect of fumaric acid on intake & growth



- ▶ Resistentsus Enterotoksilise Escherichia Coli (ETEC) vastu, võib olla tingitud geneetilistest faktoritest – ETEC resistentsemate seatõugude (liinide) kasutamine
- ▶ SAA
- ▶ Makrofaagid



TULEVIKUKS

